
Lower Passaic River Restoration Project

2012 BENTHIC INVERTEBRATE COMMUNITY REFERENCE DATA FOR THE LOWER PASSAIC RIVER STUDY AREA FINAL

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Acronyms

BERA	baseline ecological risk assessment
CPG	Cooperating Parties Group
DGPS	differential global positioning system
FS	feasibility study
GIS	geographic information system
HBI	Hilsenhoff Biotic Index
HDPE	high-density polyethylene
LPR	Lower Passaic River
LPRSA	Lower Passaic River Study Area
NTU	nephelometric turbidity unit
QAPP	quality assurance project plan
QA/QC	quality assurance/ quality control
RM	river mile
RI	remedial investigation
SDI	Swartz's dominance index
SOP	standard operating procedure
SQT	sediment quality triad
USEPA	US Environmental Protection Agency

1 Introduction

The Lower Passaic River Study Area (LPRSA, also referred to as the Site) is the 17.4-mile stretch of the Passaic River between Dundee Dam and Newark Bay that is the subject of a remedial investigation/feasibility study (RI/FS). A baseline ecological risk assessment (BERA) will be conducted as part of the RI/FS, and will be used to evaluate the potential for hazardous substances present in environmental media to impact the health of ecological receptors within the LPRSA.

The LPRSA is situated within the Lower Passaic River (LPR) watershed, which is highly urbanized and receives substantial inputs of industrial and municipal discharges. It is important to characterize both background sediment chemical concentrations and reference conditions for the system in order to identify the degree to which inputs of chemicals of concern from sources upstream of the LPRSA may be contributing to potential current and future risks in the LPRSA. The information on background sediment chemical concentrations and reference conditions will be used to place Site-related risks into context with regard to the risks resulting from exposure to regional background (i.e., non-Site-related) sources.

In this report (as well as other LPRSA reports, including the BERA), the terms “background” and “reference” are typically used to describe similar but distinct concepts. “Background” refers to the natural and ambient anthropogenic levels of chemical concentrations affecting the LPRSA, upstream reaches of the LPR, and regional reference areas (e.g., Jamaica Bay or Mullica River/Great Bay). Background concentrations have not been influenced by historical releases of pollution associated with the Site. “Reference” refers to habitats (types, quantities, and qualities), biological communities (structure, function, and toxicity or biological effects), and physical and sediment conditions (e.g., hydrodynamics, grain size, organic carbon content) that exist in areas relatively unaffected by historical Site activities (i.e., “reference areas”). Together, these factors define the “reference condition” in which LPR organisms live.

Freshwater reference sediment samples for sediment quality triad (SQT) analysis¹ were collected in November 2012 from the area of the LPR immediately above Dundee Dam. Collection methods followed those presented in the *Lower Passaic River Restoration Project Quality Assurance Project Plan: Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing* (Windward 2009), hereafter referred to as the Benthic Quality Assurance Project Plan (QAPP), and the *Lower Passaic River Restoration Project Background and Reference Conditions Addendum to the Quality Assurance Project Plan: Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing*, hereafter referred to as the Benthic QAPP Addendum No. 5 (Windward 2012).

¹ SQT samples were analyzed for chemistry, toxicity, and the benthic invertebrate community.

This data report presents the results from the benthic invertebrate community survey component of the SQT sample analysis. The results of the toxicity and chemistry analyses are presented in separate reports (Windward 2018, 2019).

1.1 PURPOSE AND SCOPE

The freshwater benthic invertebrate community survey above Dundee Dam was conducted under the authority of the May 2007 Administrative Settlement Agreement and Order on Consent (Section IX.37.d.) (USEPA 2007) between USEPA and the Cooperating Parties Group (CPG), a consortium of approximately 70 companies that agreed to complete the RI/FS of the 17.4-mile stretch of the Passaic River between Newark Bay and Dundee Dam.

The primary objectives of the 2012 sediment collection program were to collect both freshwater background sediment chemistry data and SQT data for upstream reference areas. These data will be used to provide context for Site-related risks with regard to the risks resulting from exposure to regional background (i.e., non-Site-related) chemical concentrations. The freshwater benthic invertebrate community data collected upstream of Dundee Dam as part of the SQT reference dataset will be used to document the conditions of the benthic invertebrate community expected in the freshwater portion of the LPRSA not influenced by contaminants present in the LPRSA.

1.2 DOCUMENT OVERVIEW

This document describes the results of the freshwater benthic invertebrate community reference survey conducted in a 4.1-mile area of the Passaic River upstream of Dundee Dam. Section 2 presents the sampling design and methodology. Section 3 presents the benthic invertebrate community results followed by a brief summary in Section 4 and references in Section 5. The text is supported by the following appendices:

- ◆ Appendix A – Sampling Locations
- ◆ Appendix B – Field Notebook Entries
- ◆ Appendix C – Field Records
- ◆ Appendix D – Protocol Modification Forms
- ◆ Appendix E – Photo Log
- ◆ Appendix F – Chain-of-Custody Forms
- ◆ Appendix G – Voucher Collection and QA/QC Data
- ◆ Appendix H – Taxonomy Data
- ◆ Appendix I – Summary of Benthic Invertebrate Community Metrics

2 Sampling Design and Methodology

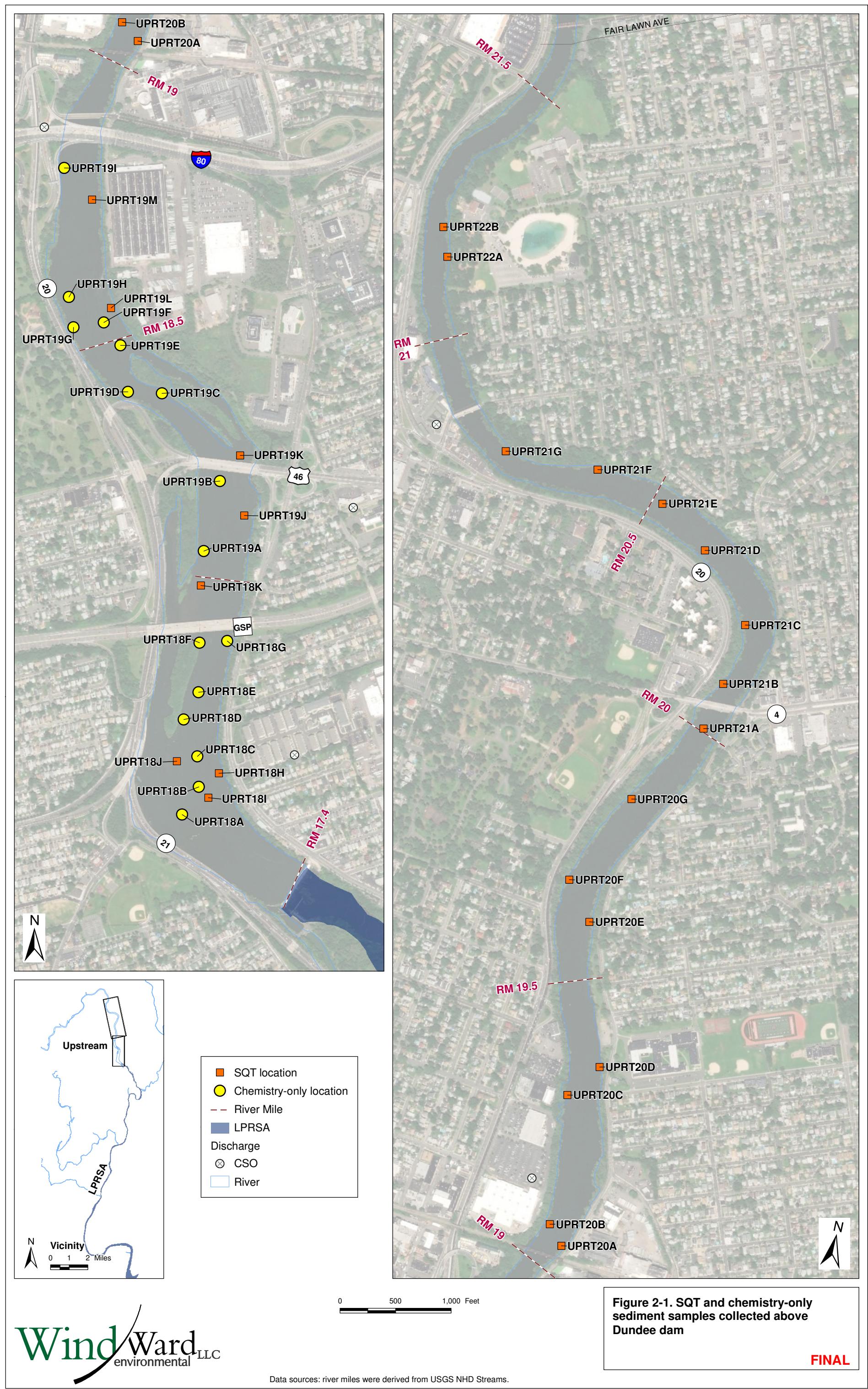
The sampling design and methodology for the 2012 freshwater reference sediment collection effort above Dundee Dam was presented in the Benthic QAPP Addendum No. 5 (Windward 2012). This section summarizes the elements of the sampling design and methodology that are relevant to the benthic invertebrate community component of the program. Section 2.1 identifies the locations sampled during the 2012 SQT reference sample collection effort conducted above Dundee Dam. Details on the methods used to collect and process surface sediment (0-to-15-cm sediment horizon) samples for benthic invertebrate community analysis are presented in Sections 2.2 and 2.3, respectively. Section 2.4 presents the methods for calculating benthic invertebrate community metrics.

2.1 SAMPLING LOCATIONS

As specified in the Benthic QAPP Addendum No. 5 (Windward 2012), freshwater benthic invertebrate community reference samples were collected at 24 SQT locations between River Mile (RM) 17.4 and RM 21.5 (Figure 2-1). The coordinates for each of the sampling locations are provided in Appendix Table A-1. The total sampling area was subdivided into four segments consisting of one 1.1-mile segment (the first segment above Dundee Dam from RM 17.4 to RM 18.5) and three 1-mile segments (RM 18.5 to RM 19.5, RM 19.5 to RM 20.5, and RM 20.5 to RM 21.5). Six locations were proposed for sampling in each segment to provide an even spatial allocation of samples.

Of the SQT samples collected within the LPRSA, approximately half of those in shallow-depth areas were targeted as fine-grained sediment, and approximately half were targeted as coarse-grained sediment.² Therefore, to be consistent, 12 of the 24 proposed SQT locations above Dundee Dam were targeted as fine-grained samples. Grain size data from previous sampling events above Dundee Dam (i.e., USEPA 2007 sampling (ddms 2011), and CPG 2008 low-resolution core sampling (AECOM 2014)) were available to help select SQT locations in the first segment (i.e., RM 17.4 to RM 18.5). No grain size data were available for the remaining three segments (i.e., RM 18.5 to RM 19.5, RM 19.5 to RM 20.5, and RM 20.5 to RM 21.5). Consequently, SQT sampling locations in these three segments were selected based on expected grain size using stream morphology and geographic information system (GIS) data. Expected depositional areas (e.g., areas inside river bends) or areas below bridge abutments were expected to have fine-grained sediment, and potential scouring areas (e.g., areas on the outside of river curves) were assumed to have coarse-grained sediment.

² Fine-grained sediment is defined as having $\geq 60\%$ fines (fines are the sum of silt and clay fractions that pass through a No. 200 sieve [i.e., less than 75 μm in diameter]). Coarse-grained sediment is defined as having $< 60\%$ fines.



Prior to sediment sampling, a two-day reconnaissance survey was conducted on October 23 and 24, 2012, to verify sampling location accessibility and confirm the grain size at the proposed locations. Grain size confirmation in the field was determined using the wet sieving methods described in Attachment AA of the Benthic QAPP Addendum No. 5 (Windward 2012). Based on the reconnaissance survey, 10 of the 24 proposed SQT locations presented in QAPP Addendum No. 5 were replaced with new locations for the following reasons:

- ◆ Location could not be accessed by boat because of shallow water or obstructions (i.e., a utility line crossing the river obstructed access to locations immediately above Dundee Dam).
- ◆ Substrate was coarser than intended; proposed location was moved to provide finer-grained material.
- ◆ Substrate at location was too rocky for grab sampler

Because Segment 4 was rockier than expected, two of the proposed sampling locations in that segment were moved downstream into Segment 3, so that four locations in Segment 4 and eight locations in Segment 3 were targeted during the sediment sampling effort. During the reconnaissance survey, coordinates for the new locations were recorded using a boat-mounted differential global positioning system (DGPS).

USEPA oversight personnel were present during both the reconnaissance survey and the sediment sampling efforts, and USEPA approved the selection of final sampling locations.

2.2 FIELD SAMPLING METHODS

This section presents the freshwater benthic invertebrate community reference sample collection, handling, and processing methods that were used during the 2012 freshwater reference sediment collection effort conducted above Dundee Dam. Sediment for chemistry analysis and toxicity testing was collected at the same time as the benthic invertebrate community samples; the processing of those samples is described in separate reports (Windward 2018, 2019).

2.2.1 Sample collection

The procedures for collecting and processing benthic invertebrate community samples followed standard freshwater methods described by the Puget Sound Estuary Program (1987) and USEPA (Barbour et al. 1999) and presented in the USEPA-approved Benthic QAPP Addendum No. 5 (Windward 2012).

DGPS was used to locate the selected sampling locations. Prior to sampling, location coordinates were entered into the DGPS. The actual position was noted using the DGPS once the sampling equipment had been deployed and was positioned on the river bottom. For the multiple grab samples collected at each sampling location, coordinates were recorded only for the grab sample that was collected farthest

downstream. Water depth at each sampling location was measured using a lead line. Water quality parameters (i.e., temperature, dissolved oxygen [DO], pH, and conductivity) were measured at each location using a multi-probe meter that was calibrated daily using standard solutions. Sampling began at the downstream end of the sampling area and proceeded upstream.

Surface sediment samples for SQT analysis were collected using a stainless steel pneumatic power grab sampler that had a 5-gal. capacity and a 0.2-m² surface area. The sampler was deployed from a pontoon boat equipped with a davit and winch. Sampling methods used during the field program are described below and also detailed in the standard operating procedure (SOP) included as Attachment D to the Benthic QAPP Addendum No. 5 (Windward 2012).

The number of surface grab samples collected at each location varied depending on the volume required, as well as the substrate and ease of sediment collection. In general, a minimum of five acceptable grab samples (e.g., one for chemistry and toxicity testing [described in separate reports], and four for benthic invertebrate community analysis [i.e., one grab sample for each of the four benthic invertebrate community replicates]) were required at each location. An additional grab sample was collected when a field duplicate or USEPA split sample was required or if there was not enough sediment available to meet volume requirements for chemistry and toxicity testing in a single grab sample. The actual number of grab samples collected for each location is provided in Appendix C (Table C-2), which documents the data collected in the field.

The power grab sampler was deployed from the sampling vessel using a winch to control the speed. Once the power grab sampler had been pulled up and brought back on board the boat, it was placed on a stand and evaluated to ensure that the grab sample was acceptable. Each sample needed to be a minimum of 15 cm (6 in.) in depth. A grab sample was considered acceptable if the sampler had penetrated a minimum of 16 cm (to ensure that 15 cm of the sample had not been in contact with the sampler) but had not over penetrated such that the sediment had come into contact with the top of the sampler frame. The depth of sediment in the grab sampler was determined using a ruler to measure the distance between the surface of the sediment in the grab sample and the top of the 22-cm-deep power grab sampler frame.

For each acceptable benthic invertebrate community sediment grab sample, the overlying water was siphoned into a 5-gal. high-density polyethylene (HDPE) bucket labeled with the location ID and replicate number and retained as part of the replicate grab sample. Surface sediment and any associated debris within a 23 cm² (9 in.²) area, to a depth of 15 cm (6 in.), was removed from of the grab sampler using a clean stainless steel spoon and added to the HDPE bucket containing the siphoned overlying water.

Excess sediment from the samples or sediment from unacceptable grab samples was returned to the collection site. If a successful grab sample could not be collected

(e.g., as a result of bottom debris or gravel or because access was obstructed), the sampling location was moved to an alternative location that was still within the defined target sampling area approved by USEPA.

2.2.2 Sample handling and processing

Benthic invertebrate community samples collected during the 2012 freshwater reference sediment collection effort were transported as soon as possible after collection to a nearby processing boat equipped with a sieving station for processing and preservation. Each of the four replicates was transferred to the processing boat in a 5-gal. HDPE bucket with an appropriately labeled lid. Samples were sieved through 0.5-mm stainless steel screens using continuously flowing water drawn from the river via submersible pumps. Photos of the sieving stations are provided in Appendix E.

Materials retained on the screen were carefully transferred into clean, labeled HDPE jars, filled with 10% buffered formalin, sealed with electrical tape, and mixed by gently inverting the jars several times to preserve the sample. The preserved benthic invertebrate community samples were transported to the CPG field facility at the end of the day and stored at room temperature until they were shipped to the taxonomy laboratory, EcoAnalysts, at the end of the 2012 freshwater reference sediment collection effort. Chain-of-custody forms that document the transport of samples to the laboratory are provided in Appendix F.

2.2.3 Field deviations

The collection and handling of the 2012 freshwater benthic invertebrate community reference samples in the field was completed as described in Benthic QAPP Addendum No. 5 (Windward 2012) with the following exception:

- ◆ During the reconnaissance survey, 12 SQT sampling locations were moved from the original target locations because the locations were either inaccessible by boat or the substrate was too coarse (e.g., rocky) to obtain acceptable sediment grab samples. Protocol Modification Form No. 1 to the Benthic QAPP Addendum No. 5 (Windward 2012) was prepared to provide the rationale for this USEPA-approved location change and the revised coordinates (Appendix D).

2.3 TAXONOMY LABORATORY METHODS

This section presents the methods used by the taxonomy laboratory to sort and identify benthic invertebrate organisms in the freshwater reference sediment samples.

2.3.1 Taxonomic identification

Upon arrival at the taxonomy laboratory, the samples were checked to ensure that they arrived in good condition and matched the chain-of-custody information. The condition of each sample was documented. Samples were given a unique tracking

number, logged into the laboratory tracking system, and transferred to the sorting laboratory.

Samples were sieved through 0.5-mm mesh screen to remove the preservative and any remaining fine sediment. Material remaining on the screen after sieving was then sorted to separate the organic material from the inorganic material. The inorganic material was inspected for organisms using a magnifying lamp (3X) before being returned to the sample containers. The organic material was transferred to a tray marked with 2-cm grids; grids were randomly selected, and material was sorted under a dissecting microscope (minimum 10X magnification), proceeding from one to the next randomly selected grid until a minimum of 300 organisms had been counted, completely sorting material in the last selected grids. The invertebrates were counted and sorted according to taxonomic group (e.g., order or class, depending on the type of invertebrate) into separate, labeled vials that contained 70% ethanol. The total number of organisms removed, the number of grids sorted (out of the total number of grids), the time spent sorting, and the final sample volume were recorded on the laboratory sorting bench sheets. Additional details on the sorting procedures are presented in the SOP provided by the taxonomy laboratory, which was included in the Benthic QAPP (Windward 2009).

Sorted samples were transferred to the taxonomists, who identified all benthic invertebrates in the samples to the lowest practical taxonomic level in accordance with the Benthic QAPP (Windward 2009). The taxonomy process included the following steps:

1. Each sample was emptied into a Petri dish, and the invertebrates were identified to the lowest practical taxonomic level using a dissecting microscope.
2. While at the microscope, the taxonomist entered each taxon and the number of individuals of each taxon into the project database using a unique taxonomic code.
3. A project-specific voucher collection was prepared by preserving at least one specimen (preferably 3 to 5 specimens) of each taxon encountered in a 1-dram vial that contained 70% ethanol. Vials were properly labeled with taxonomic identity and sample numbers.

2.3.2 QA/QC of benthic invertebrate community samples

Quality assurance and quality control (QA/QC) procedures were conducted for both the sorting process and taxonomic identification. QA/QC records for the freshwater benthic community reference samples collected above Dundee Dam are included in Appendix G.

The sorting QA/QC process was conducted according to methods described in *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* (Barbour et al. 1999). At a minimum, 10% of the sorted

samples were re-examined by a second technician who searched for organisms that were not initially found. A sample passed QC if the proportion of organisms found during re-examination of the debris was less than 10% of the total number of organisms initially found in the sample. Samples that failed QC were re-examined to determine if the failure occurred on a small scale or if the additional material needed to be resorted. Organisms counted and identified during the QC process were added to the taxonomy data for each sample.

The taxonomic identification QA/QC process involved the examination of at least 5% of the samples selected randomly by the QA taxonomist for re-identification. The percent similarity between the two sets of data was calculated, and the taxonomists discussed any discrepancies. The final data were adjusted according to the consensus of the taxonomists. In addition, a voucher collection that contained a minimum of one specimen from all taxa identified in the samples was prepared. The voucher collection is based on the collaboration between laboratory taxonomists, as well as external taxonomists, when appropriate, and serves as a reference for any future QA of the identification process for the project. The voucher collection data are presented in Appendix G.

2.3.3 Archive samples

The fourth replicate of the benthic invertebrate community samples collected from each sampling location was designated to serve as an archive sample in the event that a sample was damaged or lost during shipment or any other issues developed during data evaluation. The fourth replicate was sieved and preserved in the field as described for all other replicates and was shipped to the taxonomy laboratory along with the other three replicates. At the laboratory, the samples were transferred from 10% formalin into 70% ethanol and put in storage.

2.3.4 Laboratory deviations

The processing and analysis of the 2012 freshwater benthic invertebrate community reference samples in the laboratory was completed as described in Benthic QAPP Addendum No. 5 (Windward 2012) with the following exception:

- ◆ Two of the twenty-five boxes were lost or damaged by FedEx during shipment of the samples to the taxonomy laboratory. The loss of 18 jars affected 3 of the samples as follows:
 - ◆ **Location UPRT19K** – One of four replicates was lost. The three remaining replicates were analyzed; no sample was available for archive.
 - ◆ **Location UPRT20B** – One of four replicates was lost. The three remaining replicates were analyzed; no sample was available for archive.
 - ◆ **Location UPRT20L** – One replicate was lost, and one replicate was partially lost (i.e., 3 of 8 jars were lost). The two remaining complete replicates were

analyzed, and the one partial replicate was analyzed; no sample was available for archive. The data for the partial replicate will be qualified.

Protocol Modification Form No. 3 to the Benthic QAPP Addendum No. 5 (Windward 2012) was prepared to document these deviations (Appendix D).

2.4 CALCULATION OF BENTHIC INVERTEBRATE COMMUNITY METRICS

The freshwater benthic invertebrate community structure above Dundee Dam was quantitatively evaluated using the same metrics as those used for the LPRSA samples: a variety of descriptive statistics and standardized metrics, including abundance per m², taxonomic richness (number of species [or higher order taxa, if not identified to species] in a sample), the Shannon-Wiener diversity index (Shannon 1948), Pielou's evenness index (Pielou 1966), and Swartz's dominance index (SDI) (Swartz et al. 1985). The Hilsenhoff Biotic Index (HBI) (Hilsenhoff 1987) was also included as a metric to describe the freshwater benthic invertebrate community's tolerance to organic pollution. All the metrics are presented as the mean of replicate samples. The metrics used to characterize community structure are described below.

2.4.1 Shannon-Wiener diversity index

The Shannon-Wiener diversity index (Shannon 1948) measures the diversity of a sample by examining species (or higher-order taxa, if not identified to species), richness, and the distribution of individuals among the taxa present. The greater the diversity index value, the greater the sample diversity and the more evenly the organisms are distributed among the taxa present. It is calculated as follows:

$$H' = -\sum p_i \ln p_i \quad \text{Equation 1}$$

Where:

- H' = the diversity index
- ln = the natural logarithm
- i = an index number for each taxon present in a sample
- p_i = the number of individuals within a taxon divided by the total number of individuals present in the entire sample

2.4.2 Pielou's evenness index

Pielou's evenness index (Pielou 1966) is related to the Shannon-Wiener diversity index (Shannon 1948) in that it also describes the distribution of individuals among taxa relative to an idealized distribution. Pielou's evenness index ranges from zero to one, with higher values indicating a more even distribution of organisms among the species present in the sample.

$$J' = H'/H(\max)$$

Equation 2

Where:

- J' = the evenness index
- H' = the diversity index
- $H(\max)$ = the theoretical maximum value for H if all species in the sample were equitably distributed (i.e., natural logarithm of S , where S is the total number of taxa in a sample)

2.4.3 Swartz's dominance index

SDI (Swartz et al. 1985) represents the least number of taxa that constitute at least 75% of the total number of organisms in a sample.

2.4.4 Hilsenhoff Biotic Index

HBI (Hilsenhoff 1987) provides an indication of a freshwater benthic community's tolerance to the enrichment of organic materials and nutrients, as well as pollutants and other stressors. The index values range from 0 to 10, with higher values indicating more organic enrichment/influence in the system. The index is a weighted average of values assigned to each taxa present in a sample based on their tolerance to the enrichment of organic materials, nutrients, pollutants, and other stressors; only those species with assigned tolerance values are used in the calculation of the index. The tolerance (or sensitivity) values assigned to each species are presented in Appendix G.

3 Results

This section presents the field data and survey results from the 2012 freshwater reference sediment collection effort above Dundee Dam. Section 3.1 presents a summary of the field water quality measurements. The analyses of the freshwater benthic invertebrate communities are presented in Section 3.2. The taxonomic data, including metrics for each sample collected are presented in Appendix H, and a summary of the benthic invertebrate community metrics is presented in Appendix I.

3.1 FIELD WATER QUALITY MEASUREMENTS

Surface water quality measurements (i.e., temperature, DO, salinity, conductivity, and pH) collected during the 2012 freshwater reference sediment collection effort conducted above Dundee Dam are presented in Table 3-1 as the mean value of each parameter per river mile segment. Water quality measurements for each location are provided in Appendix C (Table C-3).

Table 3-1. Mean field-measured water quality parameters

River Mile Segment	Temperature (°C) ^a	Turbidity (NTU) ^a	DO (mg/L) ^a	Conductivity (µS/cm) ^a	Specific Conductance (µS/cm) ^b	pH ^a
RM 17.4 – RM 18.5	9.1	11.5	12.5	527	770	7.8
RM 18.5 – RM 19.5	9.4	12.5	11.3	525	723	7.7
RM 19.5 – RM 20.5	8.3	8.1	12.0	463	700	7.8
RM 20.5 – RM 21.5	8.2	9.7	12.8	460	683	8.0

^a Temperature, turbidity, DO, conductivity, and pH were measured using a multi-probe meter. The probe was suspended 1 ft above the surface of the sediment.

^b Specific conductance was calculated from conductivity and temperature measurements.

C – Celsius

NTU – nephelometric turbidity unit

DO – dissolved oxygen

RM – river mile

3.2 BENTHIC INVERTEBRATE COMMUNITY ANALYSIS

A summary of freshwater benthic invertebrate community metrics calculated for the 24 SQT samples collected above Dundee Dam is presented in Table 3-2. The mean abundance of organisms per m² was 11,367 and ranged from 1,030 at RM 18.2 (UPRT19J) to 20,600 at RM 17.6 (UPRT18I). Mean species richness (i.e., number of taxa) was 21.7 and ranged from 8.33 (UPRT19J) to 33.0 (UPRT19K) species per location. Species richness was ≥ 10 at all but one location.

Table 3-2. Summary of benthic invertebrate community metrics for 24 SQT sample locations above Dundee Dam

Statistic	Abundance (per m ²)	Species Richness	Shannon-Wiener Diversity Index	Swartz's Dominance Index	HBI ^a
Minimum	1,030	8.33	1.27	2.0	6.84
Maximum	20,600	33.0	2.75	9.67	9.69
Mean	11,367	21.7	2.12	5.33	8.49
Median	11,650	21.5	2.15	5.0	8.47
Standard deviation	5,642	6.34	0.41	2.15	0.76

^a Tolerance values used to calculate the HBI are from New York Department of Environmental Conservation (Bode et al. 2002).

HBI – Hilsenhoff Biotic Index

SQT – sediment quality triad

Thirteen of the twenty-four SQT locations had mean SDI values of 5 or more, indicating that over half of the locations were dominated by more than 5 species. The mean SDI value for the area above Dundee Dam was 5.33 and ranged from 2.0 at RM 18.0 (UPRT18J) to 9.67 at RM 19.8 (UPRT20F). The mean Shannon-Wiener diversity index value was 2.12 and ranged from 1.27 at RM 18.2 (UPRT19J) to 2.75 at RM 19.8 (UPRT20F).

The mean HBI for the area above Dundee Dam was 8.49 and ranged from 6.84 at RM 21.1 (UPRT22A) to 9.95 at RM 17.7 (UPRT18J).

Table 3-3 presents the list of species contributing to the top 10 most abundant taxa above Dundee Dam (Table 3-3). The oligochaete *Limnodrilus hoffmeisteri* was the most dominant species, followed by the oligochaete *Aulodrilus piqueti* and the dipteran *Chironomus* sp.

Table 3-3. Dominant taxa above Dundee Dam

Taxa	Dominance Ranking ^a	Total Abundance (per m ²)
Oligochaeta		
<i>Arcteonais lomondi</i>	8	1,434
<i>Aulodrilus limnobius</i>	6	2,484
<i>Aulodrilus piqueti</i>	2	3,670
<i>Limnodrilus hoffmeisteri</i>	1	11,158
<i>Quistadrilus multisetosus</i>	5	2,571
<i>Slavina appendiculata</i>	9	1,236
Tubificidae	7	2,196
Bivalvia		
<i>Corbicula</i> sp.	10	1,231
Insecta		

Table 3-3. Dominant taxa above Dundee Dam

Taxa	Dominance Ranking ^a	Total Abundance (per m ²)
<i>Chironomus</i> sp.	3	3,098
<i>Procladius</i> sp.	4	2,793

^a Dominant taxa are ranked from 1 to 10.

As shown on Figure 3-1, oligochaetes were the most abundant group above Dundee Dam (66% of all species identified). Insects were the second most dominant group (23% of all species identified). The majority of insects consisted of chironomid larvae (22% of all species identified).

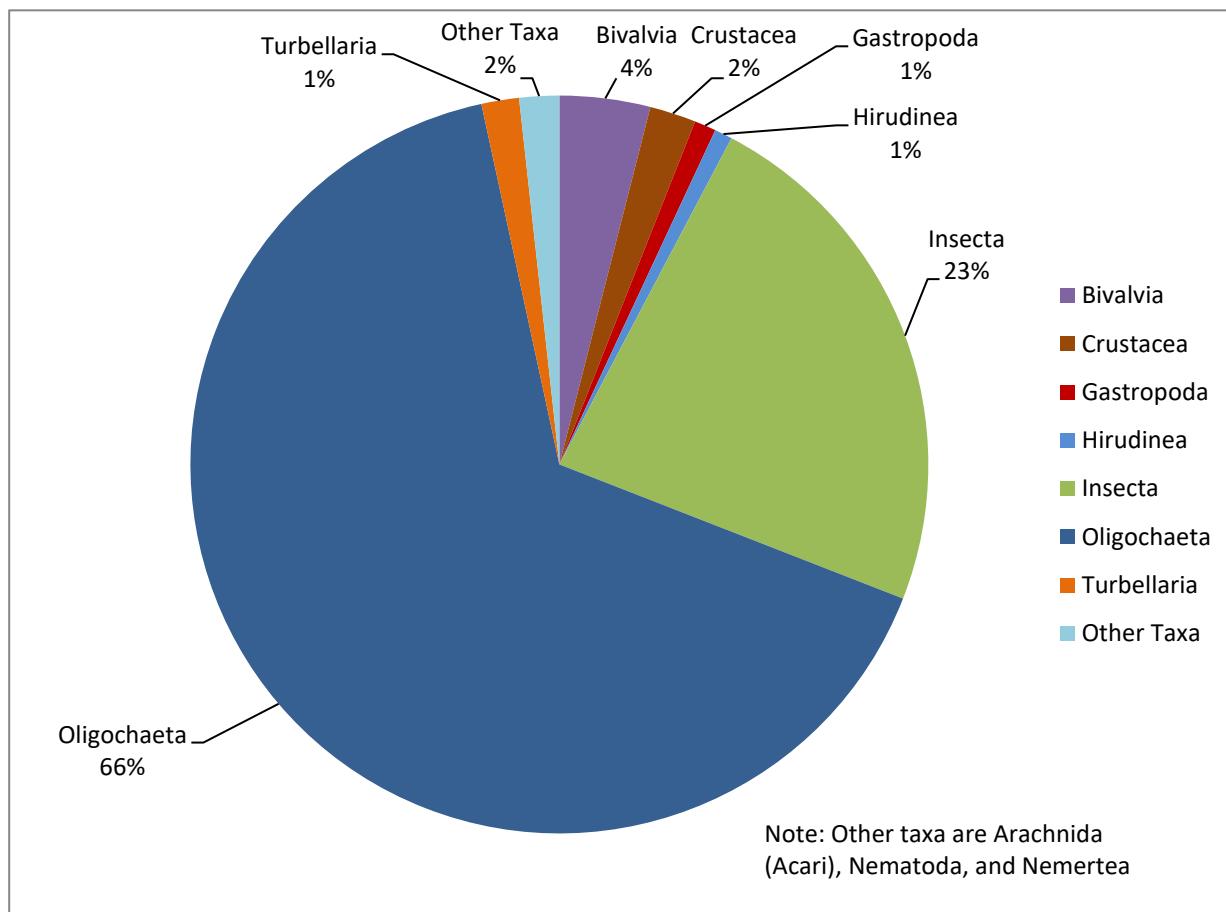


Figure 3-1. Relative abundance (per m²) of major benthic invertebrate community groups above Dundee Dam

3.3 QA/QC OF BENTHIC INVERTEBRATE SORTING AND TAXONOMIC IDENTIFICATION

Results from the QA/QC process conducted by the taxonomy laboratory on both the sorting and taxonomic identification process are provided in Appendix G. QC of the

sorting process was conducted by having a second technician re-examine 100% of the sorted samples. Eighty-five percent of the re-examined samples passed QC with at least 90% sorting efficacy (i.e., less than 10% of the total number of organisms initially found in the sample was found in the debris by the second technician). Samples initially having a sorting QC efficacy of less than 90% were re-sorted, and organisms identified during the QC process were added to the taxonomy data. During the second examination, the sorting QC efficacy was $\geq 90\%$ for all samples.

The percent similarity between the initial identification and the QA identification was greater than 97% for all but one sample. The percent similarity for sample UPRT21D-BC02 was 75.7%. The QC taxonomist identified an adult *L. hoffmeisteri*, which the original taxonomist had overlooked, changing the identification of 69 specimens labeled more generically as Tubificidae without capilliform setae to the more specific identification of *L. hoffmeisteri*. A taxonomist then reanalyzed additional samples with large numbers of Tubificidae without capilliform setae identified and made the following changes:

- ◆ **Sample UPRT19L-BC03** – 28 Tubificidae without capilliform setae were changed to 28 Tubificidae with capilliform setae.
- ◆ **Sample UPRT20C-BC01** – 42 Tubificidae without capilliform setae were changed to 42 *L. hoffmeisteri*.

The database was updated to reflect changes identified during the QA/QC process. Changes to the initial identification of individuals are summarized in the QA/QC narrative provided by the taxonomy laboratory (Appendix G). The changes in samples UPRT19L-BC03 and UPRT20C-BC01 were made after the taxonomy laboratory had submitted the QC narrative; changes are documented in an e-mail included in Appendix G.

4 Summary

The objectives of the 2012 reference sediment collection program were met with regard to the collection of SQT samples and the analysis of the benthic invertebrate community above Dundee Dam. These data will establish reference conditions for the benthic invertebrate community in the LPRSA for use in the BERA.

5 References

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APPENDIX A. SAMPLING LOCATIONS

Table A-1. 2012 freshwater sediment reference sampling locations above Dundee Dam

Sampling Location	Coordinates		Approximate RM	Collection Date/Time
	Final Easting ^{a, b}	Final Northing ^{a, b}		
UPRT18H	594662	747963	17.6	11/12/12 12:17
UPRT18I	594567	747742	17.6	11/12/12 10:13
UPRT18J	594284	748072	17.6	11/12/12 13:21
UPRT18K	594500	749655	17.9	11/12/12 14:37
UPRT19J	594891	750287	18.1	11/13/12 08:20
UPRT19K	594853	750827	18.2	11/13/12 09:46
UPRT19L	593691	752156	18.5	11/13/12 10:55
UPRT19M	593521	753134	18.7	11/13/12 11:59
UPRT20A	593933	754562	19.0	11/13/12 13:30
UPRT20B	593792	754732	19.0	11/13/12 19:41
UPRT20C	593704	755904	19.3	11/14/12 08:15
UPRT20D	593934	756211	19.3	11/14/12 09:14
UPRT20E	593573	757471	19.6	11/14/12 11:12
UPRT20F	593318	757805	19.6	11/14/12 11:49
UPRT20G	593713	758634	19.8	11/14/12 12:52
UPRT21A	594215	759390	20.0	11/14/12 13:52
UPRT21B	594304	759819	20.0	11/15/12 08:19
UPRT21C	594388	760379	20.2	11/15/12 09:17
UPRT21D	593893	760965	20.3	11/15/12 10:08
UPRT21E	593432	761295	20.4	11/15/12 10:52
UPRT21F	592798	761474	20.6	11/15/12 11:29
UPRT21G	591953	761465	20.7	11/15/12 12:25
UPRT22A	591076	763069	21.1	11/15/12 08:06
UPRT22B	590985	763326	21.1	11/15/12 09:09

^a Final easting and northing refer to DGPS coordinates that have been differentially corrected to obtain sub-foot accuracy. Coordinates were collected using vessel-mounted DGPS equipment. Coordinates provided were from the first successful grab sample for a given location.

^b New Jersey State Plane (US survey feet)

DGPS – differential global positioning system

RM – river mile

APPENDIX B. FIELD NOTEBOOK ENTRIES

INCH



Name _____

2

Phone _____

Project _____

CONTENTS

2

11.12.12

TDO

0840 Arrive at boat launch.

Foggy, 50s. Load boats w/ supplies.
Meet up w/ crew.crew boat: Jeff Rakowski (C001)
Sarah Foutner (C02)
Thai (D) (C03)
Dustin Kash (C01)
Kyle Orde (C01)

0920 H/S briefing

0930 Head downriver to first station

UPRT18J

1013 Grab 1 - 25cm, accepted. chem/tax.
 1035 Grab 2, 21cm, accepted BC01
 1046 Grab 3, 18cm, accepted BC02
 1050 Grab 4, 17cm, accepted BC03
 1103 Grab 5, 7cm, rejected
 1106 Grab 6, 10cm, rejected
 1109 Grab 7, 0 cm, rejected.
 1112 Grab 8, 0 cm, rejected
 1114 Grab 9, 0 cm, rejected
 1116 Grab 10, 0 cm, rejected
 1118 Grab 11, 0 cm, rejected
 1121 Grab 12, 0 cm, rejected
 1125 Grab 13, 0 cm, rejected

3

11.12.12

TDO

1129 Grab 14, 0 cm, rejected
 1133 Grab 15, 0 cm, rejected
 1135 Grab 16, 0 cm, rejected
 1149 Grab 17, 28cm, accepted BC04
 1200 Head upriver to UPRT18H
 1212 Grab 1, 0, rejected (stick in jaws)
 1217 Grab 2, 24cm, accepted chem/tax
 1229 Grab 3, 19cm, accepted BC01
 1237 Grab 4, 22cm, accepted BC02
 1250 Grab 5, 16cm, accepted BC03
 1256 Grab 6, 25cm, accepted BC04
 1300 Head to UPRT18J, ~10 ft off target
 b/c too shallow for boat.
 1321 Grab 1, 28cm, accepted, chem/tax
 w/ field dup (UPRT18J-FD)
 1343 Grab 2, 30cm, accepted BC01
 1352 Grab 3, 32cm, accepted BC02
 1402 Grab 4, 25cm, accepted BC03
 1412 Grab 5, 19cm, accepted BC04
 1420 Head to UPRT18K ~5ft. off target
 b/c too shallow for boat.
 1437 Grab 1, 24cm accepted, chem/tax
 1447 Grab 2, 22cm, accepted BC01
 1453 Grab 3, 26cm, accepted BC02

Rite in the Rain

4
11.12.12

- T.DD
- 1500 Grab 4, 25cm, accepted BC03
1506 Grab 5, 27 cm, accepted BC04
1600 Head back to boat launch
1620 Arrive boat launch, off load supplies and samples.
1630 Depart for field facility end of on water day.

11.12.12

T.DD

11.13.12

T.DD

- 0715 Arrive boat ramp. Load supplies.
S. Forder 3 rows.
T.DD 3
D. Kash 3 OS1
K. Cade 3
40°3, rain
0720 J. Rakowski (CON) arrives
0725 H/S boat.
0730 Head to UPRT195
0820 Grab 1, 30 cm, accepted chem/tor
narr extra vol. for EPA split
0840 Grab 2, 0P, rejected.
0846 Grab 3, 23 cm, accepted chem/tor
0858 Grab 4, 27 cm, accepted BC01
0914 Grab 5, 32 cm, accepted BC02
0919 Grab 6, 32 cm, accepted BC03
0927 Grab 7, 32 cm, accepted BC04
0940 Head to UPRT195
0945 Grab 1, 12 cm, rejected
0946 Grab 2, 21 cm, accepted chem/tor
0957 Grab 3, 12 cm, rejected BC05
0959 Grab 4, 18 cm, accepted BC01
1011 Grab 5, 22 cm, accepted BC02
1019 Grab 6, 20 cm, accepted BC03

Rite in the Rain

6
11.13.12

- 1028 Grab 7, 16 cm, accepted BCO4
 1040 Head to UPRT 19L
 1055 Grab 1, 24 cm, accepted chem/tox
 1107 Grab 2, 26 cm, accepted BCO1
 1116 Grab 3, 24 cm, accepted BCO2
 1122 Grab 4, 30 cm, accepted BCO3
 1124 Grab 5, 11 cm, rejected
 1124 Grab 6, 26 cm, accepted BCO4
 1145 Head to UPRT 19M
 1159 Grab 1, 25 cm, accepted chem/tox
 1219 Grab 2, 32 cm, accepted chem/tox
~~6.23, 10~~, (EPA split)
 1224 Grab 3, 26 cm, accepted BCO1
 1231 Grab 4, 23 cm, accepted BCO2
 1238 Grab 5, 27 cm, accepted BCO3
 1244 Grab 6, 27 cm, accepted BCO4
 1258 Head to UPRT 20A
 1330 Grab 1, 21 cm, accepted. chem/tox
~~EPA~~ EPA split station
 1343 Grab 2, 17 cm, accepted chem/tox
 1347 Grab 3, Ø, rejected
 1348 Grab 4, Ø, rejected, rock in jaws
 1349 Grab 5, 16, accepted, BCO1
 1350 Grab 6, 20, accepted BCO2

TDO

11.13.12

- 1413 Grab 7, 22, accepted BCO3
 1420 Grab 8, 16, accepted BCO4
 1435 Head to UPRT 20B
 1441 Grab 1, 24 cm, accepted chem/tox
 1456 Grab 2, 31 cm, accepted BCO1
 1503 Grab 3, 28 cm, accepted BCO2
 1511 Grab 4, 20 cm, accepted BCO3
 1517 Grab 5, 27 cm, accepted BCO4
 1545 Head back to boat launch
 1555 Arrive boat launch. Upload supplies and samples. End of on-water work.

TDO

Rate in the Rain.

11.13.12

8

11.14.12

0730 Arrive at boat launch. Load supplies.

S. Fader > WW.

T.DO

0740 CSI arrives

D. Kash

K. Orbe

0745 J. Rakowski arrives (CDW)

0755 H/S brief

0800 Head to UPRT 20C

0815 Grab 1, 32 cm, accepted chem/tox

0820 Grab 2, OP, rejected

0832 Grab 3, 28 cm, accepted BC01

0841 Grab 4, 33 cm, accepted BC02

0847 Grab 5, 33 cm, accepted BC03

0853 Grab 6, 33 cm, accepted BC04

0900 Head to UPRT 20D

0914 Grab 1, 32 cm, accepted chem/tox

1013 Grab 2, 32 cm, accepted BC01

1018 Grab 3, OP, rejected

1022 Grab 4, 29 cm, accepted BC02

1034 Grab 5, 33 cm, accepted BC03

1041 Grab 6, 32 cm, accepted BC04

1100 Head to UPRT 20E

5 Grab 1, 11 cm, rejected

T.DO

11.14.12

T.DO

1106 Grab 2, 12 cm, rejected

1107 Grab 3, 14 cm, rejected

1112 Grab 4, 24 cm, accepted chem/tox

1123 Grab 5, 25 cm, accepted BC01

1127 Grab 6, 28 cm, accepted BC02

1134 Grab 7, 23 cm, accepted BC03

1139 Grab 8, 27 cm, accepted BC04

1145 Head to UPRT 20F

1149 Grab 1, 23 cm, accepted chem/tox

1206 Grab 2, 22 cm, accepted BC01

1215 Grab 3, 28 cm, accepted BC02

1224 Grab 4, 27 cm, accepted BC03

1234 Grab 5, 28 cm, accepted BC04

1245 Head to UPRT 20G

1252 Grab 1, 22 cm, accepted chem/tox

1302 Grab 2, 23 cm, accepted BC01

1308 Grab 3, 28 cm, accepted BC02

1314 Grab 4, 26 cm, accepted BC03

1320 Grab 5, 25 cm, accepted BC04

1330 Head to UPRT 21A (13' off target 4% of substrate)

1352 Grab 1, 20 cm, accepted chem/tox

1400 Grab 2, 27 cm, accepted BC01

1407 Grab 3, 24 cm, accepted BC02

1414 Grab 4, 22 cm, accepted BC03

Rite in the Rain

10

11.14.12

1419 Grab 5, 20cm, accepted BC04

1430 Head back to boat launch to offload supplies and samples

1500 Depart boat ramp. End of on-water day.

T.DO

11

11.15.12

T.DO

0730 Arrive at boat launch. Load supplies
S. Fowler → WW

T.DO

0740 (CS1) D. Kash, K. Orde arrives

0745 (COM) J. Rakowski arrives

0750 4/S brief.

0800 Head to UPRT21B

0809 Grab 1, 32 cm, accepted chem/tox

0834 Grab 2, 33 cm, accepted BC01

0842 Grab 3, 32 cm, accepted BC02

0850 Grab 4, 33 cm, accepted BC03

0859 Grab 5, 33 cm, accepted BC04

0910 Head to UPRT21C

0917 Grab 1, 17 cm, accepted chem/tox

0932 Grab 2, 20 cm, accepted chem/tox

0937 Grab 3, 26 cm, accepted BC01

0943 Grab 4, 19 cm, accepted BC02

0951 Grab 5, 21 cm, accepted BC03

0958 Grab 6, 20 cm, accepted BC04

1003 Head to UPRT21D

1008 Grab 1, 19 cm, accepted chem/tox

1014 Grab 2, 20 cm, accepted BC01

1022 Grab 3, 19 cm, accepted BC02

1027 Grab 4, 21 cm, accepted BC03

Rite in the Rain

12

11.15.12

TDO

- 1031 Grab 5, 17cm, accepted BLO4
 1045 Head to UPRT 21E
- 1052 Grab 1, 20cm, accepted chem/tox
 1102 Grab 2, 24cm, accepted BLO1
 1104 Grab 3, Ø, rejected rock in jaws
 1104 Grab 4, 19cm, accepted BLO2
 1111 Grab 5, 16cm, accepted BLO3
 1113 Grab 6, Ø, rejected - rock in jaws
 1114 Grab 7, Ø, rejected - rock in jaws
 1118 Grab 8, 23cm accepted BLO4
 1123 Head to UPRT 21F
 1129 Grab 1, 20cm, accepted chem/tox
 1142 Grab 2, 20cm, accepted BLO1
 1147 Grab 3, 16cm, accepted BLO2
 1155 Grab 4, 16cm, accepted BLO3
 1205 Grab 5, 19cm, accepted BLO4
 1210 Head to UPRT 21G
- 1225 Grab 1, 20cm, accepted chem/tox
 1231 Grab 2, 25cm, accepted BLO1
 1235 Grab 3, 25cm, accepted BLO2
 1238 Grab 4, 25cm, accepted BLO3
 1242 Grab 5, 21cm, accepted BLO4
 1310 Head back to boat launch to offload,
 1345 Depart boat launch. End of on-water work.

TDO
11.15.12

13

11.16.12

TDO

- 0730 Arrive at boat launch 40's, ptly cloudy
 S. Fowler > NW
 T. Do
 D. Kash > OS1
 K. Ode
 J. Rakowski - COM
- 0735 Load supplies
 0740 H/S brief
 0745 Head to UPRT 22A
- 0805 Grab 1, Ø, reject, stick in jaws
 0806 Grab 2, 20cm, accepted chem/tox
 0821 Grab 3, 20cm, accepted chem/tox
 0925 Grab 4, Ø, reject, rock in jaws
 0830 Grab 5, 17cm, accepted BLO1
 0834 Grab 6, 17cm, accepted BLO2
 0838 Grab 7, 17cm, accepted BLO3
 0842 Grab 8, Ø, repeat rocks in jaws
 0844 Grab 9, 16cm, accepted BLO4
 0955 Head to UPRT 22B, 170' off ^{front} _{W/L of} location actions
- 0909 Grab 1, 23cm, accepted chem/tox
 0917 Grab 2, 18cm, accepted BLO1
 0922 Grab 3, 18cm, accepted ~~swimming~~ ⁱⁿ _{BB} ~~swimming~~ ⁱⁿ _{BB}
 0926 Grab 4, 16cm, accepted BLO2
 0933 Grab 5, 17cm, accepted BLO3

Rite in the Rain

14

11.16.12

T.DD

- 0937 Grab 6, 17cm, accepted Body
 1015 Head back to boat launch
 1030 Arrive boat launch. Offload. End of our water day.

ALL T.DD

15

S.Replinger

11.26.2012

0800 Arrive at boat launch
 Weather: 40s, sun
 Crew: Suzanne Replinger (uw)

Thai DO (uw)

Chad Miggins (uw)

Dustin Kach (OSI)

Steve Bodak (OSI)

Jeff Rakowski (OSI)

0910 Health + Safety briefing

0915 Depart boat launch. Head to UPRT18A

Approx. 20 ft. off target b/c of shallow water depth.

0953 Grab 1, 22 cm, accepted

Also collect field dup (UPRT18A-FD)
 (and mssate)

1025 Head to UPRT18B

1029 Grab 1, 23 cm, accepted

1043 Head to UPRT18C

1048 Grab 1, 26 cm, accepted

Also collect EPA split/dup sample

1107 Head to UPRT18D

1110 Grab 1, Ø, rejected

1119 Grab 2, 22 cm, accepted.

1134 Head to UPRT18E.

1139 Grab 1, 23 cm, accepted.

Rite in the Rain

16

11-26-2012

S.Replinger

- 1153 Head to UPRT18F.
 1158 Grab 1, Ø, rejected → washout
 1159 Grab 2, 27, rejected → overwinnowing
 1202 Grab 3, 30cm, accepted.

1215 Head to UPRT18G

1217 Grab 1, 29 cm, accepted.

1231 Head to UPRT19A

1238 Grab 1, 30 cm, accepted.

1301 Head to UPRT19B

1313 Grab 1, 24 cm, accepted.

1324 Head to UPRT19C

1333 Grab 1, 32 cm, accepted.

1347 Head to UPRT19D

Moved location approx. 21 ft. based on rip-rap at target loc. (to south)

- 1355 Grab 1, Ø, rejected → rock in jaws.
 1357 Grab 2, Ø rejected → debris in jaws
 1358 Grab 3, Ø, rejected → debris in jaws
 Moved loc. approx. 23 ft. to north of target based on rip-rap and unsuccessful grabs

1403 Grab 4, 26 cm, accepted.

1415 Head to UPRT19E

1417 Grab 1, 25 cm, accepted.

1449 Arrive at boat launch. offload supplies

1500 Depart boat launch. End of on-water day.

S.Replinger 11-26-12

17

11-27-2012

S.Replinger

- 0715 Arrive at boat launch. Load supplies.
 0728 H/S briefing
 0730 Depart boat launch. Head to location UPRT19F

Crew: Suzanne Replinger (uw)

Thai DO (uw)

Chad Wiggins (uw)

Jeff Rakowski (CDM)

Dustin Koehl (OSI)

Steve Bodak (OSI)

Weather: 30s, overcast, showers

0745 Grab 1, 32 cm, accepted.

0756 Head to UPRT19G.

0759 Grab 1, 32 cm, accepted.

0812 Head to UPRT19H

0815 Grab 1, 26 cm, accepted.

0825 Head to UPRT19I.

0833 Grab 1, 20 cm, accepted.

0850 Arrive at boat launch. Offload

Supplies.

0905 Depart boat launch. End of on-water field day.

S.Replinger 11-27-2012

Rite in the Rain

INCH



Name _____

2

Phone _____

Project _____

CONTENTS

²
S Replinger

0840 Arrive at UPR boat launch.

Weather: foggy, warm (60s), sunny

Crew: S. Replinger (ww)

(processing) Nancy Musgrave (ww)

Bent Bergquist (ww)

Brian Church (ww)

Ryan Bollenbach (os)

Crew:
(collection) Thai Do (ww)

Sarah Fowler (ww)

Dustin Koch (os)

Kyle Orde (os)

11.12.2012

Jeff
Rakowski (COM)

0920 Health and Safety briefing

0933 Depart boat launch to begin sampling

1001 Arrive at location UPR18I to begin processing.

10:13 - chemistry grab

10:35 - BC01 (6-1L)

10:46 - BC02 (6-1L)

10:56 - BC03 (4-1L)

11:49 - BC04 (7-1L)

1225 Arrive at location UPR18H to begin processing

12:17 - chemistry

1229 - BC01 (4-1L)

1237 - BC02 (3-1L)

1250 - BC03 (1-1L)

1256 - BC04 (6-1L)

S Replinger

11.12.2012 ³

1350 Arrive at UPR18J to begin processing

1321 - chemistry + FD

1343 - BC01 (1-1L)

1352 - BC02 (3-1L)

1402 - BC03 (2-1L)

1412 - BC04 (2-1L)

1507 Arrive at UPR18K to begin processing.

1437 - chemistry

1447 - BC01 (8-1L)

1453 - BC02 (8-1L)

1500 - BC03 (9-1L)

1506 - BC04 (9-1L)

1620 Arrive at boat launch. End of field day.

S Replinger 11.12.2012

Rite in the Rain

4

S. Replinger

11.13.2012

0820 Arrive at boat launch

Weather: overcast, showers, 50s

Crew: Suzanne Replinger (uw)
(processing) Nancy Musgrave (uw)

Bent Bergquist (uw)

Brian Church (uw)

Ryan Bollenbach (osi)

Crew: Thai Do (uw)

(collection) Sarah Fowler (uw)

Dustin Kach (osi)

Kyle Orde (osi)

Jeff Rakowski (CDM)

0825 Health + Safety briefing

0829 Depart boat launch

0845 Arrive at UPRT19J to begin processing.

0820 -chemistry (& EPA split)

0858 -BC01

0909 -BC02

0919 -BC03

0921 -BC04

1026 Arrive at UPRT19K to begin processing

0946 -chemistry

0959 -BC01

1011 -BC02

1019 -BC03

1028 -BC04

5

S. Replinger

11.13.2012

1133 Arrive at UPRT19L to begin processing

1055 -chemistry

1107 -BC01

1116 -BC02

1122 -BC03

1126 -BC04

1305 Arrive at UPRT19M to begin processing

1159 -chemistry + EPA split

1224 -BC01

1231 -BC02

1238 -BC03

1244 -BC04

1400 Begin processing UPRT20A

1330 -chemistry + EPA split

1349 -BC01

1406 -BC02

1413 -BC03

1420 -BC04

1501 Begin processing UPRT20B

1441 -chemistry

1456 -BC01

1503 -BC02

1511 -BC03

1517 -BC04

1555 - Arrive at boat launch.
End of field day.S. Replinger ✓
11.13.2012
Rained in the Rain

⁶
S. Replinger

0800 Arrive at boat launch.

Weather sunny, 30s/40s

Crew (processing): Suzanne Replinger (uw)

Bent Bergquist (uw)

Nancy Musgrave (uw)

Brian Chush (uw)

Ryan Beilensbach (osi)

Crew (collection): Thai Do (uw)

Sarah Fowler (uw)

Dustin Koch (osi)

Kyle Orde (osi)

Jeff Rakowski (cdm)

0815 Health + Safety briefing

0820 Depart boat launch.

0824 Arrive at UPRT20C to begin processing.

0815 -chemistry

0832 - BC01

0841 - BC02

0847 - BC03

0853 - BC04

0935 Begin processing UPRT20D.

0914 -chemistry

1013 - BC01

1022 - BC02

1036 - BC03

1041 - BC04

11/14/2012

S. Replinger

11/14/2012 ⁷

1109 Begin processing UPRT20E.

1112 -chemistry

1123 - BC01

1134 - BC03

1127 - BC02

1139 - BC04

1201 Begin processing UPRT20F

1149 - Chemistry

1206 - BC01

1223 - BC03

1215 - BC02

1234 - BC04

1315 Begin processing UPRT20G

1252 - chemistry

1302 - BC01

1314 - BC03

1308 - BC02

1320 - BC04

1410 Begin processing UPRT ~~20~~ 21A.

1352 - chemistry

1400 - BC01

1414 - BC03

1407 - BC02

1419 - BC04

1443 Arrive at boat launch.

1457 Depart boat launch. End of field day.

S. Replinger
11/14/2012

Rite in the Rain

8

S.Replinger

0820 Arrive at boat launch

Weather: partly sunny, 30s/40s

Crew (processing): Suzanne Replinger (uw)

Bent Bergquist (uw)

Nancy Musgrave (uw)

Brian Church (uw)

Ryan Boilenbach (osi)

Crew (collection): Thai Do (uw)

Sarah Fowler (uw)

Dustin Koch (osi)

Kyle Orde (osi)

Jeff Rakowski (COM)

0830 Health + Safety briefing

0835 Depart boat launch

0845 Begin processing UPRT21B

0819-chemistry

0834-BC01

~~0805~~

0842-BC02

0859-BC04

0850-BC03

0938 Begin processing UPRT21C

0914-chemistry

0937-BC01

0951-BC03

0943-BC02

0956-BC04

11.15.2012

S.Replinger

1025 Begin processing UPRT21D

1008-chemistry

1027-BC03

1018-BC01

1031-BC04

1022-BC02

1105 Begin processing UPRT21E

1052-chemistry

1102-BC01

1111-BC03

1106-BC02

1118-BC04

1150 Begin processing UPRT21F

1129-chemistry

1142-BC01

1155-BC03

1147-BC02

1205-BC04

1251 Begin processing UPRT21G

1225-chemistry

1231-BC01

1238-BC03

1235-BC02

1242-BC04

1335 Arrive at boat launch

1345 Depart boat launch. End of field day.

S.Replinger

11.15.2012

Rite in the Rain

9

11.15.2012

10

S.Replinger

0755 Arrive at boat launch

Weather: 40s, overcast, some sun

Crew (processing): Suzanne Replinger (ww)

Berit Bergquist (ww)

Nancy Musgrave (ww)

Brian Church (ww)

Ryan Bollenbach (osi)

Crew (collection): Thai Do (ww)

Sarah Fowler (ww)

Dustin Keach (osi)

Kyle Orde (osi)

Jeff Rakowski (CDM)

0800 Health + Safety briefing.

0805 Depart boat launch.

0823 Begin processing UPRT22A.

0806 -chemistry

0830 -BC01

0838 - BC03

0834 -BC02

0844 - BC04

0913 Begin processing UPRT22B

0909 -chemistry

0917 -BC01

0933 - BC03

0926 -BC02

0937 - BC04

1020 Arrive at boat launch.

1030 Depart boat launch. End of field day.

S.Replinger

11-16-2012

11·16·2012

11

Rite in the Rain

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Upper Passaic River
Benthic Reconnaissance Survey
Background-Reference



Rite in the Rain

ALL-WEATHER
LEVEL

No 311

October 23-24, 2012

2

10/23/12

Sunday, Cala

K. Johnson
B. Bergquist0700 Arrive at Ford Facility
Mob for Beaufort Reconnaissance

0800 Meet OSI at boat launch

Pushkar Koch OSI project mng
Carl Cantrell

Safety briefing

0836 Head up river to check access
and grain size at furthest
stations upstream

Calm - 3.5' depth at UPRT 21E

Drop mast to go under bridge at E. 83rd

0909 Collect sample

UPRT 22B-1 3.9 ft depth

Grab 1 - very small amount of
sediment

Grab 2 - clams + coarse sand

Grab 3 - Photo

3

Collect grain size

Vol. 50 ml

Coarse fraction 48 ml $\times 2 = 96\%$ coarse
4% fines

Move downstream, just off boat ramp

0925 Collect UPRT 22B-2 2.6 ft
depthsmall amount of wood debris
clams

finer sand than 22B-1 but still coarse

Vol. 50 ml

Coarse fraction 48 ml $\times 2 = 96\%$ coarse
4% fines

between stormwater outfall + ramp

0948 UPRT 22B-3

downstream of the launch ramp in
willows

Do visual check of mats

Sandy - similar to 22B-2

shrub provide more difficult
human access

Rite in the Rain.

4

Clouds forming

0952 Move to UPRT 22A 1.6 ft depth
 Grab 1
 very small amount of wood debris
 & light odor

Volume 50 ml

Coarse 33 ml $\times 2 = 66\%$ Coarse
 34% fine

1009

Move slightly downstream & across
 to R bank

Check substrate Bottom Rec 1
 Rock/riprap - no sample in
 grass

1015 Check location further downstream
 before bridge (E. 83rd St.)

Residential area -
 back yards next to E Bank
 Depth

Current

Small rocks, large
 gravel
 No sample

5

1020

Location 100 yds upstream
 E 83rd St. Bridge E Bank

Coarse -

Bottom Rec 2

Human Access except sample
 collector 30 ft off shore
 overhanging trees

1034

UPRT 21G

middle of channel

21G-1 - 5.6' depth

big rock in first grab

big rock in Grab 2

very coarse sand Grab 3

Move 1 E bank (down river)

21G-2 4.5' depth

Grab 1 - garbage

Grab 2 - roots

Grab 3 - rocks > coarse sand
 w/fine material

thin layer - m top

Move downstream - close to shore

21G-3 5.4' depth

Vol. 50ml

Coarse sand

Course 46 ml $\times 2 = 92\text{ml}$

Riprap, Roots

6

rain starting

1100 Move to UPRT 21F 4.3' depth
 Grab 1 - little sand & some silt

Grab 2 - rock

Grab 3 - no sand 20 ft downstream
 Gapping station

- Move downstream 21F-2
 DS stormwater outfall 4.1 ft
 Rock substrate - no sample depth

Move upstream - on channel
 21F-3 4.1

Grab 1 - no sample
 Rock

1115 Move to UPRT 21E

21E-1 finer small amt. organic material

Vol. 50 ml

Coarse fraction $35\text{ ml} \times 2 = 70\%$ coarse
 30% fine

1135 Bottom recog 3 21F-4 4' depth

thin layer fines - coarse sand
 some gravel, small amt. leaf litter

W/bank

Vol. 50 ml 86% coarse
 Coarse 43 ml 14% fine

7

1140 Move to UPRT 21D-1 4.8' depth
 E Bank

Grab 1 - rock

Grab 2 - sticks / lins directly out from channel

Grab 3 - debris

Grab 4 - debris.

No good sample - move upstream 30'
 Claw shells

21D-2

Grab 1 - small amt. sand looks silty

Grab 2 - empty assess material

Grab 3 - empty fine material

Grab 4 - empty on top of hard gravel

1200 Move downstream below channel

21D-3 5.7' depth

Grab 1 - rocks

21D
 Abandon area for now

1205 Move to UPRT 21C 2.8'

Grab 1 successful

Close to
W Bank

Raining in the Rain

8

21C

Some stem debris, sand, gravel,
shells

Vol. 50 ml

Course 44 ml $\times 2 = 88\%$ coarse
12% fines

Launch

1300 Meet Allan Mutter NJDEP
Sean O'Hare CDW

1330 Leave boat launch
head to Dundee Dam

line across river blocks access to

18A

18H

18I

18B

Too shallow for 18D

9

1400 Move to UPRT 18C 6.1 ft depth
chemistry station but check
main size sandy, gravel

Vol 50 ml

Course 41 ml $\times 2 = 82\%$ coarse 18% fines

1407 Check new location 2.95' depth
for UPRT 18A

18A-1 too much debris

18A-2 upstream 20' 4' depth

- pull up car buoy / debris

- Grab 2 - good sample

Sheen

Vol. 50ml

Course 21 ml $\times 2 = 42\%$ Coarse
58% Fines

1430 Find location transe 18D

18D-1 Coordinates in OSI 2.4' depth

1438

1440 UPRT 18J - target is WY
island \rightarrow move to main stem
sand silt

46 ml coarse \rightarrow 92% coarse
8% fine

Rite in the Rain

10

1450 Relocate 18E to other side of bar - Get Coordinates
Substrate - sandy

1455 Move to UPRT 18F 7.6' depth
Chemistry station but
click substrate
silty sand

Course 39 ml x 2 = 78% Coarse
22% Fine

1504 Move to UPRT 18G 10.4' depth
by Parkway Human Access
Chemistry station
sandy - good grass

Click depth toward w bank
below GS Pkwy
Could get sample towards
shore of bar

1515 Relocate UPRT 18K to E side
of bar - west side is too shallow
for boat

Course 45 x 2 = 90% Coarse 10%
18K-1 - click grain size 5
18K-2 similar substrate to
18K-1
fine to med sand/trace silt
plus coarse sand
shells

Depth

3.1'

1530 Relocate UPRT 19A 3.1'
to main stem side of sandbar
Chemistry station - click substrate
sandy 22% fine

39 ml x 2 = 78% coarse

1540 Move to possible relocation of
UPRT 19J 4.5' depth
19J-1 Down from 4L Bridge
Human Access - runs in water

Fine - sheen
silty clay?

Vol. 50 ml

12 ml x 2 = 24% coarse
76% fine

Rite in the Rain.

11

Depth 1.2'

12

1553 Move to UPRT 19B Depth 6.3 ft
 Chemistry station
 Substrate check - fine sand
 ~ 70% coarse

1604 Move to target 19J to
 check access
 162 ft from actual
 proposed
 Depth 1.2 ft.

19J-2 -

Layer of fines on top of sand.
 Odor - homogenize in bowl
 $26\text{ ml Coarse} \times 2 = 52\%$ 48% fines

1616 Move to UPRT 19E

Benthic region 5 2.3' depth
 on w. of P. Island

Substrate

Fine sand, leaf + stem debris
 $47\text{ ml Coarse} \times 2 = 94\%$ Coarse 6% fine

1626 Move to benthic UPRT 19E
 riprap bank deeper
 19E-1 Depth 13.7'

13

Chemistry station - clock substrate
 Hard substrate - No sample in grab

(19E-2) Move up river w/ overhanging veg.
 ~30 ft.
 Good grab, sandy
 Depth 13'

1645 Move to UPRT 19L
 Depth 2.9'
 wide spot US from P Island
 EBank over Lampy trees
 Sandy substrate
 100% Coarse

1656 Move to chemistry station UPRT 19F 9.5 ft
 check substrate with probe
 - Sandy

1658 Move to chemistry station UPRT 19G
 Probe substrate - soft
 Check grain size because 9.5 ft depth
 West Bank -
 fines, silt, bit of leaf litter

Coarse 20ml \rightarrow 40% coarse
 60% fines

Rite in the Rain

14

1707 Move to Chemistry Station UPRT 19T
Probe - substrate looks good

1712 Move to UPRT 19M

coarse sand/gravel
across river from bank on
road w/ SW outfall
50% coarse \rightarrow 100% coarse
depth

1718 UPRT 19T

Depth 4.5'.
Chemistry but check grain sizes

by
Rt 80 Bridge painting possible CSO
just upstream

49% coarse \rightarrow 98% coarse
2% fines

15

1745 Return to boat launch

Do work
Return to Field Facility

Leave Field Facility

1742

Rite in the Rain

16

10/24/12

Cloudy, slight rain

0730 Meet at boat launch
Head to UPRT 21B

Benthic Recon b - to potentially
replace 22C
US Rt 4 Bridge Depth 2.6'

^{SW}
Pole E 594302.77 759818.58
^{NW}
N 03 fine on top with organic material
fine sand underneath

Val. 50ml

25 ml coarse 50% coarse
50% fine

0800 Move to 21B Depth 2.9'
0820

OS Rt 4 Bridge against W Bank
fine sand, some organic

40 ml coarse → 86% coarse
20% fine

17

21A

Move to ~~21E~~

mid channel OS 4 Bridge
SW on flat on E Bank
Depth 7.4'

dark layer on top, rocks, shells
gravel
clams smear

24 ml x 2 48% coarse
52% fine

0845 Move DS to find alternative
locations for RM 225 sites

Benthic Recon 7 E Bank
Depth 7.4'

Grab 1 Big Rock

Grab 2 Rock

Grab 3 Rock

0855 Move to W Bank
sandy Depth 3.5'
some organics

^{SW}
Recon 8
45 ml coarse → 96% coarse
10% fine (fine in the rain)

18

0906 Move to 20F

Fox on W. Bank

Depth 2'

W Bank by road garbage
fine sand40 ml Coarse \Rightarrow 80% Coarse, 20% Fine

0920 Move to 20E

E Bank Depth 2.4'

Grab 1 - sticks, debris

Grab 2 - big ball of material
- amphipodsGrab 3 - clams, debris
fine material on top of
gravel

US of Boat launch

40 ml Coarse

80% Coarse

20% Fine

19

0930 Move to 20D -

target is at boat launch

Move 20D-1 just DS of Boat Launch

Depth 1.4'

Fluff 5.4'

Course 18 ml \Rightarrow 36% Coarse
64% FinesMove US of boat launch
20D-2 Depth 3'

Fins + debris on top of gravel

Course 46 ml 72% Coarse
8% Fine

20D-3 - check mid channel

Depth 4.7'

Sand, gravel

Coarse sand

100% Coarse

Rite in the Rain.

20

Rain

1007 Move to UPRT 20C
W Bank Depth 5.9'

fine

ft
200 ft upstream CSO

course 17 ml 34% Coarse 66% fines

1025 UPRT 20B target 215 ft
downstream CSO

bubbly at CSO (underwater
discharge?)

move out into channel a bit?
Depth 5.6'

Fine - clay on top

Some plant material

18% Coarse
82% Fine

21

1035 Move to UPRT 20 A
E Bank above RR Bridge
Depth 11.3'

Gravel - Brick, clams

7ml coarse clay.

14% Coarse 12% Sand 86% Fine

1050 Benthic Recon 9

Depth 8.8'

check E bank location

between RR Bridge + Boat launch

Sandy fine debris clams
organic material

46 ml. Coarse
92% Coarse
8% fines

Rate in the Rain.

22

1215 Go Back upstream Depth 4.5
to check some substrate

West Bank check wear
21F
21F-5 - typical
Rocky

Move downstream -

Benthic Recon 10
Try midchannel below 21E
Good sample Depth 4.5'
Coarse sand ~100%

Move further downstream

Benthic Recon 11
Try midchannel Depth 5.6'

Sand - medium coarse
~98%

offwater 1300

K. Tobison

23

APPENDIX C. FIELD RECORDS

Appendix C. Field Records

Table C-1. 2012 freshwater reference sediment field data

Sampling Location	Collection Date/Time	Weather	Sediment Type	Sediment Color	Sediment Odor	Comments
UPRT18H	11/12/12 12:17	sun, 60s	fine/medium/coarse sand	brown	none	plant/wood debris
UPRT18I	11/12/12 10:13	fog, sun, 50s/60s,	fine/medium/coarse sand, silt	brown	none	leaf/plant/wood debris, shell fragments, plastic
UPRT18J	11/12/12 13:21	sun, 60s	fine/medium sand, silt	brown	none	plant debris, shell fragments, some organic matter, plastic; field duplicate UPRT18J-FD
UPRT18K	11/12/12 14:37	sun, 60s	gravel, fine/medium, coarse sand, silt	brown	none	leaf/plant/wood debris, shell fragments
UPRT19J	11/13/12 08:20	overcast, rain, 50s	fine/medium sand, silt	gray/black	slight, H ₂ S/ petroleum	mostly fine sand and silt; organic debris, sheen; USEPA split sample location
UPRT19K	11/13/12 09:46	rain, 40s	fine/medium/coarse sand, trace silt	brown	none	woody debris, leaf litter, shell fragments
UPRT19L	11/13/12 10:55	rain, 40s	gravel, fine/medium/coarse sand	brown	none	plant/wood debris, shell fragments, trash
UPRT19M	11/13/12 11:59	rain, 40s	gravel, fine/medium/coarse sand, trace silt	brown	none	wood debris, shell fragments, glass; USEPA split sample location
UPRT20A	11/13/12 13:30	rain, 40s	gravel, fine/medium/coarse sand, silt	brown, brown surface	none	shell fragments, organic matter, clams, trash debris USEPA split sample location
UPRT20B	11/13/12 14:41	rain, 40s	fine/medium sand, silt	brown	slight, H ₂ S	leaf/plant/wood debris, leaves, clams, shell fragments
UPRT20C	11/14/12 08:15	sun, 40s	silt	brown	slight, petroleum	leaf litter, sheen
UPRT20D	11/14/12 09:14	sun, 40s	fine/trace medium sand, silt	brown	slight, petroleum	leaf/wood debris, sheen

Table C-1. 2012 freshwater reference sediment field data

Sampling Location	Collection Date/Time	Weather	Sediment Type	Sediment Color	Sediment Odor	Comments
UPRT20E	11/14/12 11:12	sun, 40s	gravel, medium/coarse sand	brown	none	wood debris, shell fragments, amphipods
UPRT20F	11/14/12 11:49	sun, 40s	fine sand, silt	brown/black	slight, petroleum	leaf/plant debris, organic matter, clams, sheen
UPRT20G	11/14/12 12:52	sun, 40s	fine/medium/coarse sand	brown	none	leaf litter, shell fragments
UPRT21A	11/14/12 13:52	sun, 40s	trace gravel, medium/coarse sand	brown	none	leaf debris, shell fragments, glass, trash, clams
UPRT21B	11/15/12 08:19	sun, 40s	fine/medium/trace coarse sand, silt	brown/gray	slight, petroleum	leaf litter, plastic
UPRT21C	11/15/12 09:17	sun, 40s	gravel, fine/medium/coarse sand	brown	slight, petroleum	plant/wood debris, leaf litter, shell fragments, glass
UPRT21D	11/15/12 10:08	sun, 40s	trace cobble, gravel, medium/coarse sand	brown	slight, H ₂ S	shell hash, glass
UPRT21E	11/15/12 10:52	sun, 40s	fine/medium/coarse sand, trace silt	brown	none	leaf debris, shell fragments
UPRT21F	11/15/12 11:29	sun, 40s	fine/medium sand, trace silt	brown	slight H ₂ S	leaf/wood debris, plastic, trash
UPRT21G	11/15/12 12:25	sun, 40s	medium/coarse sand	brown	none	leaf litter, wood debris, shell fragments
UPRT22A	11/16/12 08:06	overcast, 40s	gravel, fine/medium/coarse sand	brown	none	wood debris, shell fragments, clams
UPRT22B	11/16/12 09:09	overcast, 40s	gravel, fine/medium/coarse sand	brown	none	wood debris, shell fragments, glass, clams

Note: All samples were collected using a grab sampler and obtained from the 0 to 15 cm depth of the grab.

Table C-2. 2012 freshwater reference sediment collection data

Sampling Location	Sediment Grab Attempt ^a	Attempt Date/Time	Acceptable Grab? ^b	Penetration Depth (cm) ^c	Water Depth (m) ^d	Benthic Community Subsample ID	Comments
UPRT18H	UPRT18H-A1	11/12/12 12:12	no	0	1	na	stick in jaws
	UPRT18H-A2	11/12/12 12:17	yes	24	1	na	RPD < 0.5 cm; plant/wood debris
	UPRT18H-A3	11/12/12 12:29	yes	19	1	UPRT18H-BC01	RPD < 0.5 cm; plant/wood debris
	UPRT18H-A4	11/12/12 12:37	yes	22	1	UPRT18H-BC02	RPD < 0.5 cm; plant/wood debris
	UPRT18H-A5	11/12/12 12:50	yes	16	1	UPRT18H-BC03	RPD < 0.5 cm; plant debris, plastic
	UPRT18H-A6	11/12/12 12:56	yes	25	1	UPRT18H-BC04	RPD < 0.5 cm; plant/wood debris
UPRT18I	UPRT18I-A1	11/12/12 10:13	yes	25	1.7	na	RPD < 0.5 cm; leaf/plant/wood debris, shell fragments
	UPRT18I-A2	11/12/12 10:35	yes	21	1.7	UPRT18I-BC01	RPD < 0.5 cm; leaf/plant/wood debris, shell fragments, plastic
	UPRT18I-A3	11/12/12 10:46	yes	18	1.7	UPRT18I-BC02	RPD < 0.5 cm; leaf/plant/wood debris, shell fragments, plastic
	UPRT18I-A4	11/12/12 10:56	yes	17	1.7	UPRT18I-BC03	RPD < 0.5 cm; leaf/plant/wood debris, shell fragments, plastic
	UPRT18I-A5	11/12/12 11:03	no	7	1.7	na	insufficient penetration
	UPRT18I-A6	11/12/12 11:06	no	10	1.7	na	insufficient penetration
	UPRT18I-A7	11/12/12 11:09	no	0	1.7	na	insufficient penetration
	UPRT18I-A8	11/12/12 11:12	no	0	1.7	na	insufficient penetration
	UPRT18I-A9	11/12/12 11:14	no	0	1.7	na	insufficient penetration
	UPRT18I-A10	11/12/12 11:16	no	0	1.7	na	insufficient penetration
	UPRT18I-A11	11/12/12 11:18	no	0	1.7	na	insufficient penetration
	UPRT18I-A12	11/12/12 11:21	no	0	1.7	na	insufficient penetration
	UPRT18I-A13	11/12/12 11:25	no	0	1.7	na	insufficient penetration
	UPRT18I-A14	11/12/12 11:29	no	0	1.7	na	insufficient penetration
	UPRT18I-A15	11/12/12 11:33	no	0	1.7	na	insufficient penetration
	UPRT18I-A16	11/12/12 11:35	no	0	1.7	na	insufficient penetration
	UPRT18I-A17	11/12/12 11:49	yes	28	1.7	UPRT18I-BC04	RPD < 0.5 cm; leaf/plant/wood debris, shell fragments, plastic

Table C-2. 2012 freshwater reference sediment collection data

Sampling Location	Sediment Grab Attempt ^a	Attempt Date/Time	Acceptable Grab? ^b	Penetration Depth (cm) ^c	Water Depth (m) ^d	Benthic Community Subsample ID	Comments
UPRT18J	UPRT18J-A1	11/12/12 13:21	yes	28	0.3	na	RPD < 0.5 cm; shell fragments, plant/plastic debris, organic matter; field duplicate UPRT18J-FD
	UPRT18J-A2	11/12/12 13:43	yes	30	0.3	UPRT18J-BC01	RPD < 0.5 cm; plant/organic matter, plastic
	UPRT18J-A3	11/12/12 13:52	yes	32	0.3	UPRT18J-BC02	RPD < 0.5 cm; plant/organic matter, wood, plastic
	UPRT18J-A4	11/12/12 14:02	yes	25	0.3	UPRT18J-BC03	RPD < 0.5 cm; plant matter, organic debris, wood, plastic
	UPRT18J-A5	11/12/12 14:12	yes	19	0.3	UPRT18J-BC04	RPD < 0.5 cm
UPRT18K	UPRT18K-A1	11/12/12 14:37	yes	24	0.24	na	RPD < 0.5 cm; shell fragments, leaf/plant/wood debris
	UPRT18K-A2	11/12/12 14:47	yes	22	0.24	UPRT18K-BC01	RPD < 0.5 cm; leaf/plant debris, shell fragments
	UPRT18K-A3	11/12/12 14:53	yes	26	0.24	UPRT18K-BC02	RPD = 0 cm; trace plant debris, shell fragments
	UPRT18K-A4	11/12/12 15:00	yes	25	0.24	UPRT18K-BC03	RPD = 0 cm; shell fragments, brick fragment
	UPRT18K-A5	11/12/12 15:06	yes	27	0.24	UPRT18K-BC04	RPD = 0 cm; shell fragment, clams
UPRT19J	UPRT19J-A1	11/13/12 08:20	yes	30	1.16	na	RPD < 0.5 cm; sheen, plant/organic debris; USEPA split sample location
	UPRT19J-A2	11/13/12 08:40	no	0	1.16	na	insufficient penetration
	UPRT19J-A3	11/13/12 08:46	yes	23	1.16	na	RPD < 0.5 cm; sheen, plant debris; USEPA split sample location
	UPRT19J-A4	11/13/12 08:58	yes	26	1.16	UPRT19J-BC01	RPD < 0.5 cm; sheen, plant/organic debris
	UPRT19J-A5	11/13/12 09:09	yes	32	1.16	UPRT19J-BC02	RPD < 0.5 cm; sheen, plant/organic debris
	UPRT19J-A6	11/13/12 09:19	yes	32	1.16	UPRT19J-BC03	RPD < 0.5 cm; sheen, organic debris
	UPRT19J-A7	11/13/12 09:27	yes	32	1.16	UPRT19J-BC04	RPD < 0.5 cm; sheen, worms, organic matter
UPRT19K	UPRT19K-A1	11/13/12 09:45	no	12	0.3	na	insufficient penetration
	UPRT19K-A2	11/13/12 09:46	yes	21	0.3	na	RPD = 0 cm; wood/plant debris, shell fragments, plastic trash
	UPRT19K-A3	11/13/12 09:57	no	12	0.3	na	insufficient penetration
	UPRT19K-A4	11/13/12 09:59	yes	18	0.3	UPRT19K-BC01	RPD = 0 cm; shell fragments, wood/plant debris, trash
	UPRT19K-A5	11/13/12 10:11	yes	22	0.3	UPRT19K-BC02	RPD = 0 cm; wood debris, trash, shell fragments
	UPRT19K-A6	11/13/12 10:19	yes	20	0.3	UPRT19K-BC03	RPD = 0 cm; wood debris, trash, shell fragments
	UPRT19K-A7	11/13/12 10:28	yes	16	0.3	UPRT19K-BC04	RPD = 0 cm; wood debris, trash, shell fragments

Table C-2. 2012 freshwater reference sediment collection data

Sampling Location	Sediment Grab Attempt ^a	Attempt Date/Time	Acceptable Grab? ^b	Penetration Depth (cm) ^c	Water Depth (m) ^d	Benthic Community Subsample ID	Comments
UPRT19L	UPRT19L-A1	11/13/12 10:55	yes	24	0.75	na	RPD < 0.5 cm; plant/wood debris, shell fragments, clams, plastic
	UPRT19L-A2	11/13/12 11:07	yes	26	0.75	UPRT19L-BC01	RPD = 0 cm; shell fragments, wood debris, plastic trash
	UPRT19L-A3	11/13/12 11:16	yes	24	0.75	UPRT19L-BC02	RPD = 0 cm; wood debris, shell fragments, plastic, glass
	UPRT19L-A4	11/13/12 11:22	yes	30	0.75	UPRT19L-BC03	RPD = 0 cm; wood debris, shell fragments, trash
	UPRT19L-A5	11/13/12 11:24	no	11	0.75	na	insufficient penetration
	UPRT19L-A6	11/13/12 11:26	yes	26	0.75	UPRT19L-BC04	RPD = 0 cm; shell fragments, trash, wood/plant debris
UPRT19M	UPRT19M-A1	11/13/12 11:59	yes	25	1.68	na	RPD < 0.5 cm; shell fragments; USEPA split sample location
	UPRT19M-A2	11/13/12 12:19	yes	32	1.68	na	RPD = 0 cm; shell fragments, glass; USEPA split sample location
	UPRT19M-A3	11/13/12 12:24	yes	26	1.68	UPRT19M-BC01	RPD = 0 cm; shell fragments, plastic, wood debris
	UPRT19M-A4	11/13/12 12:31	yes	23	1.68	UPRT19M-BC02	RPD = 0 cm; shell fragments, wood debris
	UPRT19M-A5	11/13/12 12:38	yes	27	1.68	UPRT19M-BC03	RPD = 0 cm; shell fragments, wood debris
	UPRT19M-A6	11/13/12 12:44	yes	27	1.68	UPRT19M-BC04	RPD = 0 cm; shell fragments
UPRT20A	UPRT20A-A1	11/13/12 13:30	yes	21	3	na	RPD < 0.5 cm; shell fragments, organic matter, clams, trash USEPA split sample
	UPRT20A-A2	11/13/12 13:43	yes	17	3	na	RPD < 0.5 cm; clams, shell fragments; USEPA split sample location
	UPRT20A-A3	11/13/12 13:47	no	0	3	na	insufficient penetration
	UPRT20A-A4	11/13/12 13:48	no	0	3	na	insufficient penetration
	UPRT20A-A5	11/13/12 13:49	yes	16	3	UPRT20A-BC01	RPD < 0.5 cm; shell fragments, clams, plant debris
	UPRT20A-A6	11/13/12 14:06	yes	20	3	UPRT20A-BC02	RPD < 0.5 cm; shell fragments, clams, wood debris
	UPRT20A-A7	11/13/12 14:13	yes	22	3	UPRT20A-BC03	RPD < 0.5 cm; clams, shell fragments
	UPRT20A-A8	11/13/12 14:20	yes	16	3	UPRT20A-BC04	RPD < 0.5 cm; clams, shell fragments

Table C-2. 2012 freshwater reference sediment collection data

Sampling Location	Sediment Grab Attempt ^a	Attempt Date/Time	Acceptable Grab? ^b	Penetration Depth (cm) ^c	Water Depth (m) ^d	Benthic Community Subsample ID	Comments
UPRT20B	UPRT20B-A1	11/13/12 14:41	yes	24	0.78	na	RPD < 0.5 cm; leaf debris, wood/plant debris
	UPRT20B-A2	11/13/12 14:56	yes	31	0.78	UPRT20B-BC01	RPD < 0.5 cm; leaf debris
	UPRT20B-A3	11/13/12 15:03	yes	28	0.78	UPRT20B-BC02	RPD < 0.5 cm; wood/leaf litter, clams, shell fragments
	UPRT20B-A4	11/13/12 15:11	yes	20	0.78	UPRT20B-BC03	RPD < 0.5 cm; wood, leaf litter, clams, plants, shell fragments
	UPRT20B-A5	11/13/12 15:17	yes	27	0.78	UPRT20B-BC04	RPD < 0.5 cm; shell fragments, plant/wood debris
UPRT20C	UPRT20C-A1	11/14/12 08:15	yes	32	2.6	na	RPD = 0.5 cm; leaf litter, trash, sheen
	UPRT20C-A2	11/14/12 08:20	no		2.6	na	over penetration
	UPRT20C-A3	11/14/12 08:32	yes	28	2.6	UPRT20C-BC01	RPD = 0.5 cm; leaf litter, sheen
	UPRT20C-A4	11/14/12 08:41	yes	33	2.6	UPRT20C-BC02	RPD = 0.5 cm; leaf litter, sheen
	UPRT20C-A5	11/14/12 08:47	yes	33	2.6	UPRT20C-BC03	RPD = 0.5 cm; leaf litter, sheen
	UPRT20C-A6	11/14/12 08:53	yes	33	2.6	UPRT20C-BC04	RPD = 0.5 cm; leaf litter, sheen
UPRT20D	UPRT20D-A1	11/14/12 09:14	yes	32	1.57	na	RPD = 0.5 cm; leaf/wood debris, trash, sheen
	UPRT20D-A2	11/14/12 10:13	yes	32	1.57	UPRT20D-BC01	RP = 0.5 cm; leaf/wood debris, sheen
	UPRT20D-A3	11/14/12 10:18	no		1.57	na	over penetration
	UPRT20D-A4	11/14/12 10:22	yes	29	1.57	UPRT20D-BC02	RPD < 0.5 cm; leaf litter, wood debris, sheen
	UPRT20D-A5	11/14/12 10:36	yes	33	1.57	UPRT20D-BC03	RPD < 0.5 cm; leaf litter, wood debris, sheen, clams
	UPRT20D-A6	11/14/12 10:41	yes	32	1.57	UPRT20D-BC04	RPD < 0.5 cm; leaf litter, wood, sheen
UPRT20E	UPRT20E-A1	11/14/12 11:05	no	11	0.68	na	insufficient penetration
	UPRT20E-A2	11/14/12 11:06	no	12	0.68	na	insufficient penetration
	UPRT20E-A3	11/14/12 11:07	no	14	0.68	na	insufficient penetration
	UPRT20E-A4	11/14/12 11:12	yes	24	0.68	na	RPD = 0 cm; shell fragments, wood debris
	UPRT20E-A5	11/14/12 11:23	yes	25	0.68	UPRT20E-BC01	RPD = 0 cm; shell fragments, plants, wood debris
	UPRT20E-A6	11/14/12 11:27	yes	28	0.68	UPRT20E-BC02	RPD = 0 cm; shell fragments, leaf litter, amphipods
	UPRT20E-A7	11/14/12 11:34	yes	23	0.68	UPRT20E-BC03	RPD = 0 cm; shell fragments, clams, wood debris, glass, plants
	UPRT20E-A8	11/14/12 11:39	yes	27	0.68	UPRT20E-BC04	RPD = 0 cm; shell fragments, glass, wood/plants, amphipods

Table C-2. 2012 freshwater reference sediment collection data

Sampling Location	Sediment Grab Attempt ^a	Attempt Date/Time	Acceptable Grab? ^b	Penetration Depth (cm) ^c	Water Depth (m) ^d	Benthic Community Subsample ID	Comments
UPRT20F	UPRT20F-A1	11/14/12 11:49	yes	23	1.72	na	RPD < 0.5 cm; sheen, leaf litter, plants, organic debris, clams
	UPRT20F-A2	11/14/12 12:06	yes	22	1.72	UPRT20F-BC01	RPD < 0.5 cm; sheen, leaf litter, organic debris, clams
	UPRT20F-A3	11/14/12 12:15	yes	28	1.72	UPRT20F-BC02	RPD < 0.5 cm; sheen, plant debris, leaf litter, amphipods
	UPRT20F-A4	11/14/12 12:24	yes	27	1.72	UPRT20F-BC03	RPD < 0.5 cm; shell fragments, leaf litter, plant debris, sheen
	UPRT20F-A5	11/14/12 12:34	yes	28	1.72	UPRT20F-BC04	RPD < 0.5 cm; sheen, leaf litter, plant matter, shell fragments, clams
UPRT20G	UPRT20G-A1	11/14/12 12:52	yes	22	0.9		RPD < 0.5 cm; leaf litter, shell fragments
	UPRT20G-A2	11/14/12 13:02	yes	23	0.9	UPRT20G-BC01	RPD = 0 cm; leaf litter, shell fragments
	UPRT20G-A3	11/14/12 13:08	yes	28	0.9	UPRT20G-BC02	RPD = 0 cm; leaf litter, shell fragments
	UPRT20G-A4	11/14/12 13:14	yes	26	0.9	UPRT20G-BC03	RPD = 0 cm; shell fragments
	UPRT20G-A5	11/14/12 13:20	yes	25	0.9	UPRT20G-BC04	RPD = 0 cm; shell fragments
UPRT21A	UPRT21A-A1	11/14/12 13:52	yes	20	1.95	na	RPD = 0 cm; lots of shell fragments, glass, leaf debris, plastic
	UPRT21A-A2	11/14/12 14:00	yes	27	1.95	UPRT21A-BC01	RPD = 0 cm; lots of shell fragments, clams, trace plant debris
	UPRT21A-A3	11/14/12 14:07	yes	24	1.95	UPRT21A-BC02	RPD = 0 cm; shell fragments, clams, leaf litter
	UPRT21A-A4	11/14/12 14:14	yes	22	1.95	UPRT21A-BC03	RPD = 0 cm; shell fragments, clams, leaf/wood debris
	UPRT21A-A5	11/14/12 14:19	yes	20	1.95	UPRT21A-BC04	RPD = 0 cm; shell fragments, clams, wood debris
UPRT21B	UPRT21B-A1	11/15/12 08:19	yes	32	0.71	na	RPD < 0.5 cm; lots of leaf litter, plastic
	UPRT21B-A2	11/15/12 08:34	yes	33	0.71	UPRT21B-BC01	RPD < 0.5 cm; leaf litter
	UPRT21B-A3	11/15/12 08:42	yes	32	0.71	UPRT21B-BC02	RPD < 0.5 cm; leaf litter
	UPRT21B-A4	11/15/12 08:50	yes	33	0.71	UPRT21B-BC03	RPD < 0.5 cm; leaf litter
	UPRT21B-A5	11/15/12 08:59	yes	33	0.71	UPRT21B-BC04	RPD < 0.5 cm; leaf litter

Table C-2. 2012 freshwater reference sediment collection data

Sampling Location	Sediment Grab Attempt ^a	Attempt Date/Time	Acceptable Grab? ^b	Penetration Depth (cm) ^c	Water Depth (m) ^d	Benthic Community Subsample ID	Comments
UPRT21C	UPRT21C-A1	11/15/12 09:17	yes	17	0.74	na	RPD < 0.5 cm; shell fragments, leaf litter, trash, glass, wood debris
	UPRT21C-A2	11/15/12 09:32	yes	20	0.74	na	RPD < 0.5 cm; shell fragments, leaf litter, wood debris, glass, trash
	UPRT21C-A3	11/15/12 09:37	yes	26	0.74	UPRT21C-BC01	RPD = 0 cm; leaf litter, plants, wood, glass, shell fragments
	UPRT21C-A4	11/15/12 09:43	yes	19	0.74	UPRT21C-BC02	RPD = 0 cm; plants, wood debris, leaf litter, shell fragments
	UPRT21C-A5	11/15/12 09:51	yes	21	0.74	UPRT21C-BC03	RPD = 0 cm; shell fragments, plants, wood debris
	UPRT21C-A6	11/15/12 09:56	yes	20	0.74	UPRT21C-BC04	RPD = 0 cm; shell fragments, plants, wood debris
UPRT21D	UPRT21D-A1	11/15/12 10:08	yes	19	0.86	na	RPD < 0.5 cm; leaf litter, shell fragments, glass
	UPRT21D-A2	11/15/12 10:18	yes	20	0.86	UPRT21D-BC01	RPD = 0 cm; shell fragments, glass
	UPRT21D-A3	11/15/12 10:22	yes	19	0.86	UPRT21D-BC02	RPD = 0 cm; shell fragments, glass, leaf debris
	UPRT21D-A4	11/15/12 10:27	yes	21	0.86	UPRT21D-BC03	RPD < 0.5 cm; shell fragments, glass
	UPRT21D-A5	11/15/12 10:31	yes	17	0.86	UPRT21D-BC04	RPD = 0 cm; shell fragments, glass
UPRT21E	UPRT21E-A1	11/15/12 10:52	yes	26	1.22	na	RPD < 0.5 cm; shell fragments, leaf debris
	UPRT21E-A2	11/15/12 11:02	yes	24	1.22	UPRT21E-BC01	RPD = 0 cm; shell fragments
	UPRT21E-A3	11/15/12 11:04	no	0	1.22		insufficient penetration
	UPRT21E-A4	11/15/12 11:06	yes	19	1.22	UPRT21E-BC02	RPD = 0 cm; shell fragments
	UPRT21E-A5	11/15/12 11:11	yes	16	1.22	UPRT21E-BC03	RPD = 0 cm; shell fragments
	UPRT21E-A6	11/15/12 11:13	no	0	1.22	na	insufficient penetration
	UPRT21E-A7	11/15/12 11:14	no	0	1.22	na	insufficient penetration
	UPRT21E-A8	11/15/12 11:18	yes	23	1.22	UPRT21E-BC04	RPD = 0 cm; shell fragments
UPRT21F	UPRT21F-A1	11/15/12 11:29	yes	20	0.52	na	RPD < 0.5 cm; leaf/wood debris, plastic
	UPRT21F-A2	11/15/12 11:42	yes	20	0.52	UPRT21F-BC01	RPD < 0.5 cm; leaf/wood debris
	UPRT21F-A3	11/15/12 11:47	yes	16	0.52	UPRT21F-BC02	RPD < 0.5 cm; leaf/wood debris, plastic
	UPRT21F-A4	11/15/12 11:55	yes	16	0.52	UPRT21F-BC03	RPD < 0.5 cm; leaf/wood debris, plastic
	UPRT21F-A5	11/15/12 12:05	yes	19	0.52	UPRT21F-BC04	RPD < 0.5 cm; leaf/wood debris

Table C-2. 2012 freshwater reference sediment collection data

Sampling Location	Sediment Grab Attempt ^a	Attempt Date/Time	Acceptable Grab? ^b	Penetration Depth (cm) ^c	Water Depth (m) ^d	Benthic Community Subsample ID	Comments
UPRT21G	UPRT21G-A1	11/15/12 12:25	yes	20	1.57	na	RPD = 0 cm; leaf litter, shell fragments, wood debris
	UPRT21G-A2	11/15/12 12:31	yes	25	1.57	UPRT21G-BC01	RPD = 0 cm; shell fragments
	UPRT21G-A3	11/15/12 12:35	yes	25	1.57	UPRT21G-BC02	RPD = 0 cm; shell fragments
	UPRT21G-A4	11/15/12 12:38	yes	25	1.57	UPRT21G-BC03	RPD = 0 cm; shell fragments, clams
	UPRT21G-A5	11/15/12 12:42	yes	24	1.57	UPRT21G-BC04	RPD = 0 cm; shell fragments, wood debris
UPRT22A	UPRT22A-A1	11/16/12 08:05	no	0	0.83	na	stick in jaws
	UPRT22A-A2	11/16/12 08:06	yes	20	0.83	na	RPD < 0.5 cm; wood, shell fragments, clams
	UPRT22A-A3	11/16/12 08:21	yes	20	0.83	na	RPD = 0 cm; wood, shell fragments, clams, brick fragment
	UPRT22A-A4	11/16/12 08:25	no	0	0.83	na	rock in jaws
	UPRT22A-A5	11/16/12 08:30	yes	17	0.83	UPRT22A-BC01	RPD = 0 cm; wood, shell fragments, clams
	UPRT22A-A6	11/16/12 08:34	yes	17	0.83	UPRT22A-BC02	RPD = 0 cm; wood, shell fragments, clams
	UPRT22A-A7	11/16/12 08:38	yes	17	0.83	UPRT22A-BC03	RPD = 0 cm; shell fragments, clams, wood/metal debris
	UPRT22A-A8	11/16/12 08:42	no	0	0.83	na	rock in jaws
	UPRT22A-A9	11/16/12 08:44	yes	16	0.83	UPRT22A-BC04	RPD = 0 cm; shell fragments, clams, wood, glass bottle
UPRT22B	UPRT22B-A1	11/16/12 09:09	yes	23	0.99	na	RPD = 0 cm; clams, shell fragments, wood debris, glass
	UPRT22B-A2	11/16/12 09:17	yes	18	0.99	UPRT22B-BC01	RPD = 0 cm; clams, shell fragments, wood, glass
	UPRT22B-A3	11/16/12 09:22	no	18	0.99		sweater in jaws
	UPRT22B-A4	11/16/12 09:26	yes	16	0.99	UPRT22B-BC02	RPD = 0 cm; shell fragments, clams, wood, glass
	UPRT22B-A5	11/16/12 09:33	yes	17	0.99	UPRT22B-BC03	RPD = 0 cm; shell fragments, clams, wood, glass
	UPRT22B-A6	11/16/12 09:37	yes	17	0.99	UPRT22B-BC04	RPD = 0 cm; shell fragments, clams, wood, glass

^a Samples were collected using a grab sampler and obtained from the 0 to 15 cm depth of the grab.

^b A grab was considered acceptable if the sampler had penetrated a minimum of 16 cm (to ensure that 15 cm (6 in.) of the sample had not been in contact with the sampler).

^c Penetration depth was obtained using a ruler to measure the distance between the surface sediment and the top of the sampler frame and subtracting from the depth of the sampler.

^d Water depth was measured using a lead line.

ID – identification

na – not available

RPD – redox potential discontinuity

USEPA – US Environmental Protection Agency

Table C-3. 2012 freshwater reference sample location field-measured water quality parameters

Sampling Location	Collection Date/Time	Water Depth (ft)	Temperature (°C) ^a	Dissolved Oxygen (mg/L) ^a	Conductivity (µS/cm) ^a	Specific Conductivity (µS/cm) ^b	pH ^a
UPRT18H	11/12/12 12:06	3.7	8.8	12.50	540	780	7.9
UPRT18I	11/12/12 10:06	5.6	8.6	12.31	510	750	7.9
UPRT18J	11/12/12 13:09	1.0	8.7	12.50	520	760	7.8
UPRT18K	11/12/12 14:31	0.8	8.7	12.38	520	800	7.7
UPRT19J	11/13/12 08:18	3.8	9.9	12.58	540	760	7.9
UPRT19K	11/13/12 09:44	1.0	9.9	12.43	530	770	7.9
UPRT19L	11/13/12 10:52	2.5	9.8	11.70	530	740	7.7
UPRT19M	11/13/12 11:56	5.5	10.0	11.40	520	720	7.7
UPRT20A	11/13/12 13:28	9.9	9.9	11.41	530	720	7.7
UPRT20B	11/13/12 14:39	2.6	9.6	11.05	530	720	7.7
UPRT20C	11/14/12 08:14	2.4	8.5	11.04	530	720	7.8
UPRT20D	11/14/12 09:12	5.1	8.5	11.03	510	720	7.6
UPRT20E	11/14/12 11:11	2.2	8.4	11.26	510	730	7.8
UPRT20F	11/14/12 11:48	5.7	8.8	11.42	480	690	7.8
UPRT20G	11/14/12 12:52	3.0	8.7	11.74	480	690	7.7
UPRT21A	11/14/12 13:52	6.4	9.1	12.76	430	700	8.0
UPRT21B	11/15/12 08:19	2.3	7.6	11.70	430	700	7.7
UPRT21C	11/15/12 09:17	2.4	7.8	11.82	470	700	7.8
UPRT21D	11/15/12 10:08	2.8	8.0	12.42	430	700	7.9
UPRT21E	11/15/12 10:52	4.0	8.3	12.95	470	690	8.0
UPRT21F	11/15/12 11:29	1.7	8.8	12.53	480	690	7.9
UPRT21G	11/15/12 12:25	5.2	8.9	13.66	470	680	8.2
UPRT22A	11/16/12 08:06	2.7	7.6	12.38	450	680	7.9
UPRT22B	11/16/12 09:09	3.3	7.7	12.73	440	680	8.0

^a Temperature, DO, conductivity, and pH were measured using a YSI multi-probe meter. The probe was suspended 1 ft above the sediment for all measurements.

^b Specific conductance was calculated from conductivity and temperature measurements.

C – Celsius

APPENDIX D. PROTOCOL MODIFICATION FORMS

Protocol Modification Form: PMF No. 1 for Benthic QAPP Addendum No. 5

Project Name and Number:

Passaic RI 09.58.02.41

Material to be Sampled:

Sediment

Measurement Parameter:

Relocating SQT sediment sampling locations

Standard Procedure for Field Collection & Laboratory Analysis (cite reference):

Worksheet No. 18 in Benthic QAPP Addendum No. 5, Proposed Sampling Locations and Methods/SOP Requirements Table, and Benthic QAPP Figures 1a – 1c (map of target sampling locations)

Reason for Change in Field Procedure or Analysis Variation:

Sampling locations were moved during the 2012 benthic field effort for the collection of background-reference sediment samples upstream of Dundee Dam. Locations were moved from proposed locations as presented in Worksheet No. 18 of Benthic QAPP Addendum No. 5 for one of the following reasons:

1. QAPP target location was inaccessible by boat.
2. Substrate at QAPP target location was too rocky to obtain good grab sample.

Variation from Field or Analytical Procedure:

Table 1 provides the new coordinates for the sediment quality triad (SQT) locations that were moved and the rationale for the relocation. The final locations are shown on Figure 1 attached to this PMF. Figure 2 provides the proposed locations for the sediment samples that will be collected for chemistry-only sediment samples (chemistry-only sediment sample collection is scheduled to begin November 26, 2012).

Special Equipment, Materials or Personnel Required:

None

Initiator's Name:

D.B.DL. Date: 11/19/12

Project Manager:

Krisi Sabin Date: 11/19/12

QA Manager:

Jad Hershler Date: 11/19/12

USEPA Authority:

____ Date: _____

Table 1. SQT Sampling Locations to Establish Freshwater Background-Reference Conditions

Sampling Location	New Location?	Rationale for Moving Location	Easting (X) ^{a, b}	Northing (Y) ^{a, b}	RM	Data Collection Method	Analyses	Rationale for Monitoring Location
UPRT18H	Yes	Original location (UPRT18H) was below obstruction (pipe crossing river) and inaccessible by boat	594662	747963	17.6	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Targeted nearshore location; field-measured grain size from October 2012 reconnaissance 42% coarse, 58% fines
UPRT18I	Yes	Original location (UPRT18I) was below obstruction (pipe crossing river) and inaccessible by boat	594567	747742	17.6	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Targeted coarse grain sediment; field-measured grain size from October 2012 reconnaissance 82% coarse, 18% fines
UPRT18J	Yes	Original location in side channel (UPRT18J) was too shallow for boat access; moved to main stem	594284	748072	17.6	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area between Dundee Dam and I-80; field-measured grain size from October 2012 reconnaissance 92% coarse, 8% fines
UPRT18K	Yes	Original location in side channel (UPRT18K) was too shallow for boat access; moved to main stem	594500	749655	17.9	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area between Dundee Dam and I-80; field-measured grain size from October 2012 reconnaissance 90% coarse, 8% fines
UPRT19J	Yes	Original location in side channel (UPRT19K) was too shallow for boat access; moved to main stem	594891	750287	18.1	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area between Dundee Dam and I-80; field-measured grain size from October 2012 reconnaissance 24% coarse, 76% fines
UPRT19K	Yes	Original location in side channel (UPRT19J) was too shallow for boat access; moved to main stem	594853	750827	18.2	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area between Dundee Dam and I-80; field-measured grain size from October 2012 reconnaissance 52% coarse, 48% fines

Table 1. SQT Sampling Locations to Establish Freshwater Background-Reference Conditions

Sampling Location	New Location?	Rationale for Moving Location	Easting (X) ^{a, b}	Northing (Y) ^{a, b}	RM	Data Collection Method	Analyses	Rationale for Monitoring Location
UPRT19L	No	na	593691	752156	18.5	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area between Dundee Dam and I-80; field-measured grain size from October 2012 reconnaissance 100% coarse
UPRT19M	No	na	593521	753134	18.7	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area between Dundee Dam and I-80; field-measured grain size from October 2012 reconnaissance 100% coarse
UPRT20A	No	na	593933	754562	19.0	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 14% coarse, 86% fines
UPRT20B	No	na	593792	754732	19.0	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 18% coarse, 82% fines
UPRT20C	No	na	593704	755904	19.3	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 34% coarse, 66% fines
UPRT20D	Yes	Original location (UPRT20D) was in middle of boat launch at Elmwood Park	593934	756211	19.3	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Target fine-grain sediment at location with human access points along river; field-measured grain size from October 2012 reconnaissance 36% coarse, 64% fines

Table 1. SQT Sampling Locations to Establish Freshwater Background-Reference Conditions

Sampling Location	New Location?	Rationale for Moving Location	Easting (X) ^{a, b}	Northing (Y) ^{a, b}	RM	Data Collection Method	Analyses	Rationale for Monitoring Location
UPRT20E	No	na	593573	757471	19.6	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 20% coarse, 80% fines
UPRT20F	No	na	593318	757805	19.6	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 20% coarse, 80% fines
UPRT20G	Yes	Original location was above RM 21.3 where water is shallow and contains large rocks and is inaccessible by boat	593713	758634	19.8	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 90% coarse, 10% fines
UPRT21A	No	na	594215	759390	20.0	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 48% coarse, 52% fines
UPRT21B	Yes	Moved to provide finer grain size; field-measured grain size for original location (UPRT21B) during October 2012 reconnaissance was 80% coarse, 20% fines	594304	759819	20.0	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 50% coarse, 50% fines
UPRT21C	No	na	594388	760379	20.2	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 88% coarse, 12% fines

Table 1. SQT Sampling Locations to Establish Freshwater Background-Reference Conditions

Sampling Location	New Location?	Rationale for Moving Location	Easting (X) ^{a, b}	Northing (Y) ^{a, b}	RM	Data Collection Method	Analyses	Rationale for Monitoring Location
UPRT21D	Yes	Substrate at original location (UPRT21F) was rocky; moved location down river	593893	760965	20.3	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 86% coarse, 14% fines
UPRT21E	Yes	Substrate at original location (UPRT21D) was rocky; moved location down river	593432	761295	20.4	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 100% coarse, 0% fines
UPRT21F	No	Not moved; original ID number (UPRT21E) was changed to provide consecutive number sequence	592798	761474	20.6	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 70% coarse, 30% fines
UPRT21G	Yes	Substrate at original location (UPRT21G) was rocky; moved location down river	591953	761465	20.7	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Randomly selected for spatial coverage of area above I-80; field-measured grain size from October 2012 reconnaissance 92% coarse, 8% fines
UPRT22A	No	na	591076	763069	21.1	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Potential human access location adjacent to Fairlawn Park; field-measured grain size from October 2012 reconnaissance 66% coarse, 34% fines
UPRT22B	No	na	590985	763326	21.1	Grab sampler	Toxicity test, sediment chemistry, taxonomy	Potential human access location adjacent to Fairlawn Park; field-measured grain size from October 2012 reconnaissance 96% coarse, 4% fines

^a Coordinates replace the target coordinates of these locations presented in Worksheet 18 of the Benthic the QAPP. Coordinates provided were from the first successful grab sample for a given location.

^b New Jersey State Plane (US survey feet).

ID – identification

na – not applicable

RM – river mile

SQT – sediment quality triad

Protocol Modification Form: PMF No. 3 for Benthic QAPP Addendum No. 5

Project Name and Number: Passaic RI 09.58.02.41

Material to be Sampled: Sediment

Measurement Parameter: Archived benthic invertebrate community samples

Standard Procedure for Field Collection & Laboratory Analysis (cite reference):

Worksheet No. 11 in Benthic QAPP Addendum No. 5, Project Quality Objectives/Systematic Planning Process Statements; Benthic Invertebrate Community Analyses

Reason for Change in Field Procedure or Analysis Variation:

Jars containing the benthic invertebrate community samples were distributed among 25 boxes and shipped via FedEx to the taxonomy laboratory, EcoAnalysts in Moscow, Idaho for taxonomic identification. During shipment, one of the boxes containing 18 jars was completely lost by FedEx and another box was damaged and three of the eighteen jars in the box were damaged beyond use.

Variation from Field or Analytical Procedure:

The loss of the 18 jars affected 3 of the benthic invertebrate community stations. The impact and resolution for each of the 3 stations is as follows:

- UPRT19K: One of four replicates was lost. The three remaining replicates were analyzed; no sample was available to archive
- UPRT20B: One of four replicates was lost. The three remaining replicates were analyzed; no sample was available to archive
- UPRT20L: One replicate was completely lost and one replicate was partially lost (3 of 8 jars were lost). The two remaining complete replicates were analyzed and the one partial replicate was analyzed; no sample was available to archive. The data for the partial replicate will be qualified.

Special Equipment, Materials or Personnel Required:

None

Initiator's Name:  _____ Date: 5/8/13

Project Manager:  _____ Date: 5/9/13

QA Manager:  _____ Date: 5/9/13

USEPA Authority: _____ Date: _____

APPENDIX E. PHOTO LOG

Photo No.:	1
Date:	11.14.12
Description: Sampling vessel with power grab sampler	



Photo No.:	2
Date:	11.16.12
Description: Grab sampler	



Photo No.:	3
Date:	11.16.12
Description: Grab sampler	



Photo No.:	4
Date:	11.16.12
Description: Sieving stations on sample processing boat for sieving benthic invertebrate community samples	

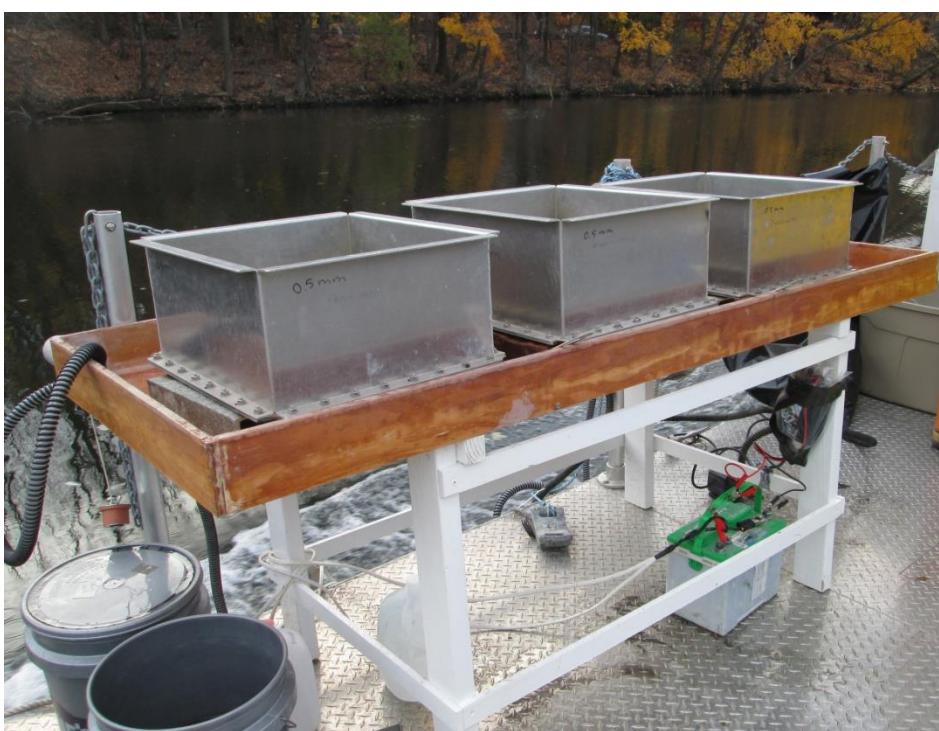


Photo No.:	5	
Date:	11.16.12	
Description:	Sieving benthic invertebrate community samples	
Photo No.:	6	
Date:	11.16.12	
Description:	Filling jars with benthic invertebrate community samples	

Photo No.:	7
Date:	11.16.12
Description: Adding formalin to the jars to preserve the benthic invertebrate community samples	



Photo No.:	8
Date:	11.16.12
Description: Examples of clams found in many sediment samples collected above Dundee Dam	



Photo No.:	9
Date:	11.16.12
Description: Filling out paperwork	

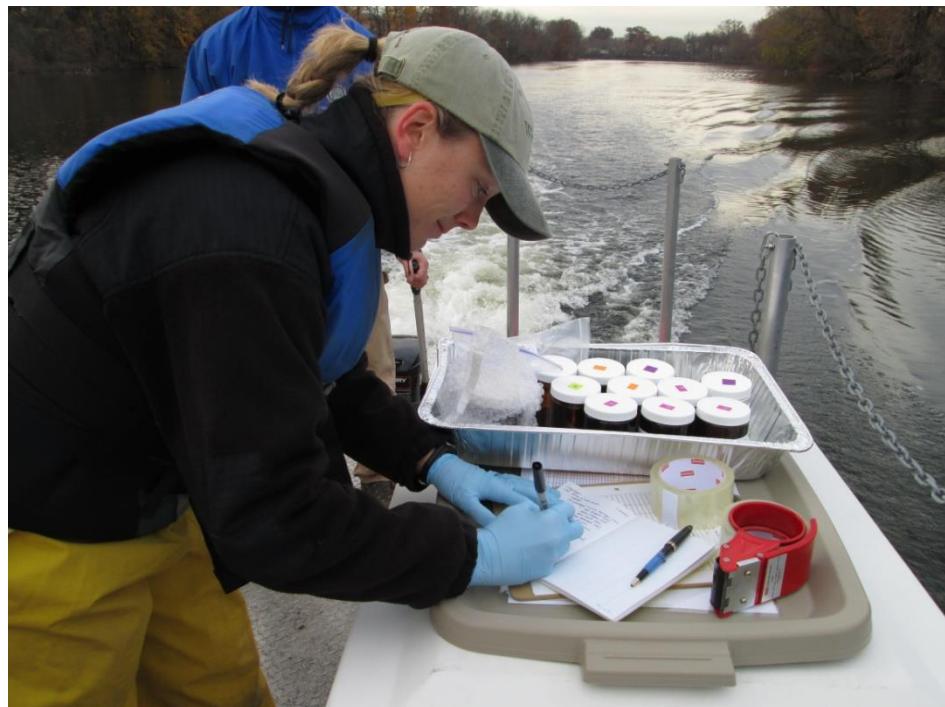


Photo No.:	10
Date:	11.16.12
Description: Filling jars from homogenized sample for chemistry analysis	



Photo No.:	11
Date:	11.16.12
Description: Toxicity sample in Teflon bag	



Photo No.:	12
Date:	11.16.12
Description: Sealed Teflon bag	



APPENDIX F. CHAIN-OF-CUSTODY FORMS

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: **Passaic RI/FS Background and Ref Sediment**
 Project Number: **Task 39.1**
 Contact Name: **Karen Tobaison**
 Sampled By: **Thai Do**

Ship to: **EcoAnalysts** # UPR-EA111312-1
 Attn: **Shandra McGraw** Shipping Date: **11.13.12**
 Shipper: **FedEx Ground** Airbill Number: **N/A**
 Form filled out by: **T. Do** Turnaround requested: **Standard**

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Taxonomy	Test(s) Requested (check test(s) required)					Comments / Instructions [Jar tag number(s)]
11.12.12	1035	UPRT18I-BC01	6	Tissue	X						Freshwater zone
11.12.12	1046	UPRT18I-BC02	6	Tissue	X						Freshwater zone
11.12.12	1056	UPRT18I-BC03	4	Tissue	X						Freshwater zone
11.12.12	1149	UPRT18I-BC04	7	Tissue	X						Freshwater zone
11.12.12	1229	UPRT18H-BC01	4	Tissue	X						Freshwater zone
11.12.12	1237	UPRT18H-BC02	3	Tissue	X						Freshwater zone
11.12.12	1250	UPRT18H-BC03	1	Tissue	X						Freshwater zone
11.12.12	1352	UPRT18J-BC02	3	Tissue	X						Freshwater zone
11.12.12	1402	UPRT18J-BC03	2	Tissue	X						Freshwater zone
11.12.12	1412	UPRT18J-BC04	2	Tissue	X						Freshwater zone
Total Number of Containers			38/72	Purchase Order / Statement of Work #2012-0043							
1) <u>Released by:</u> Company: Windward Environmental Date/Time: 11.13.12/0700 <u>Rec'd by:</u> Company: EcoAnalysts Date/Time:	2) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	3) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	4) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	5) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:							

To be completed by Laboratory upon sample receipt:



200 West Mercer Street
 Suite 401
 Seattle, WA 98119
 Tel: (206) 378-1364
 Fax: (206) 217-9343

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: **Passaic RI/FS Background and Ref Sediment**

Project Number: **Task 39.1**

Contact Name: **Karen Tobiason**

Sampled By: **Thai Do**

Ship to:	EcoAnalysts	# UPR-EATI1512-2
Attn:	<u>Shandra McGraw</u>	Shipping Date: <u>11.13.12</u>
Shipper:	<u>FedEx Ground</u>	Airbill Number: <u>N/A</u>
Form filled out by:	<u>T. Do</u>	Turnaround requested: <u>Standard</u>

To be completed by Laboratory upon sample receipt:



200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name:	Passaic RI/FS Background and Ref Sediment	Ship to:	EcoAnalysts	# UPR-EA111412-1
Project Number:	Task 39.1	Attn:	Shandra McGraw	Shipping Date: 11.13.12
Contact Name:	Karen Tobiason	Shipper:	FedEx Ground	Airbill Number: N/A
Sampled By:	Thai Do	Form filled out by:	T. Do	Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Taxonomy	Test(s) Requested (check test(s) required)					Comments / Instructions [Jar tag number(s)]
11.12.12	1256	UPRT18H-BC04	6	Tissue	X						Freshwater zone
11.12.12	1343	UPRT18J-BC01	1	Tissue	X						Freshwater zone
11.13.12	0858	UPRT19J-BC01	1	Tissue	X						Freshwater zone
11.13.12	0909	UPRT19J-BC02	1	Tissue	X						Freshwater zone
11.13.12	0919	UPRT19J-BC03	1	Tissue	X						Freshwater zone
11.13.12	0927	UPRT19J-BC04	1	Tissue	X						Freshwater zone
11.13.12	0959	UPRT19K-BC01	6	Tissue	X						Freshwater zone
11.13.12	1011	UPRT19K-BC02	5	Tissue	X						Freshwater zone
11.13.12	1019	UPRT19K-BC03	4	Tissue	X						Freshwater zone
11.13.12	1028	UPRT19K-BC04	6	Tissue	X						Freshwater zone
Total Number of Containers		32/131	Purchase Order / Statement of Work #2012-0043								
1) <u>Released by:</u>  Company: Windward Environmental Date/Time: 11.14.12/0730 <u>Rec'd by:</u> Company: EcoAnalysts Date/Time:	2) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	3) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	4) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	5) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:							

To be completed by Laboratory upon sample receipt:



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Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: **Passaic RI/FS Background and Ref Sediment**
 Project Number: **Task 39.1**
 Contact Name: **Karen Tobiason**
 Sampled By: **Thai Do**

Ship to: **EcoAnalysts** # UPR-EA111412-2
 Attn: **Shandra McGraw** Shipping Date: **11.14.12**
 Shipper: **FedEx Ground** Airbill Number: **N/A**
 Form filled out by: **T. Do** Turnaround requested: **Standard**

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Taxonomy	Test(s) Requested (check test(s) required)					Comments / Instructions [Jar tag number(s)]
11.13.12	1107	UPRT19L-BC01	8	Tissue	X						Freshwater zone
11.13.12	1116	UPRT19L-BC02	8	Tissue	X						Freshwater zone
11.13.12	1122	UPRT19L-BC03	9	Tissue	X						Freshwater zone
11.13.12	1126	UPRT19L-BC04	8	Tissue	X						Freshwater zone
11.13.12	1224	UPRT19M-BC01	8	Tissue	X						Freshwater zone
11.13.12	1231	UPRT19M-BC02	5	Tissue	X						Freshwater zone
11.13.12	1238	UPRT19M-BC03	6	Tissue	X						Freshwater zone
11.13.12	1244	UPRT19M-BC04	9	Tissue	X						Freshwater zone
11.13.12	1349	UPRT20A-BC01	5	Tissue	X						Freshwater zone
11.13.12	1406	UPRT20A-BC02	8	Tissue	X						Freshwater zone
Total Number of Containers			74/131	Purchase Order / Statement of Work #2012-0043							
1) <u>Released by:</u> Company: Windward Environmental Date/Time: 11.14.12/0730 <u>Rec'd by:</u> Company: EcoAnalysts Date/Time:	2) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	3) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	4) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	5) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:							

To be completed by Laboratory upon sample receipt:



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 Suite 401
 Seattle, WA 98119
 Tel: (206) 378-1364
 Fax: (206) 217-9343

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: **Passaic RI/FS Background and Ref Sediment**

Project Number: **Task 39.1**

Contact Name: **Karen Tobiason**

Sampled By: **Thai Do**

Ship to:	EcoAnalysts	# UPR-EA111412-3
Attn:	<u>Shandra McGraw</u>	Shipping Date: <u>11.14.12</u>
Shipper:	<u>FedEx Ground</u>	Airbill Number: <u>N/A</u>
Form filled out by:	T. Do	Turnaround requested: Standard

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Tel: (206) 378-1364
Fax: (206) 217-9343

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: **Passaic RI/FS Background and Ref Sediment**
 Project Number: **Task 39.1**
 Contact Name: **Karen Tobiason**
 Sampled By: **Thai Do**

Ship to: **EcoAnalysts** # UPR-EA111512-1
 Attn: **Shandra McGraw** Shipping Date: **11.15.12**
 Shipper: **FedEx Ground** Airbill Number: **N/A**
 Form filled out by: **T. Do** Turnaround requested: **Standard**

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Taxonomy	Test(s) Requested (check test(s) required)					Comments / Instructions [Jar tag number(s)]
11.14.12	0832	UPRT20C-BC01	1	Tissue	X						Freshwater zone
11.14.12	0841	UPRT20C-BC02	1	Tissue	X						Freshwater zone
11.14.12	0847	UPRT20C-BC03	1	Tissue	X						Freshwater zone
11.14.12	0853	UPRT20C-BC04	1	Tissue	X						Freshwater zone
11.14.12	1013	UPRT20D-BC01	2	Tissue	X						Freshwater zone
11.14.12	1022	UPRT20D-BC02	1	Tissue	X						Freshwater zone
11.14.12	1036	UPRT20D-BC03	2	Tissue	X						Freshwater zone
11.14.12	1041	UPRT20D-BC04	1	Tissue	X						Freshwater zone
11.14.12	1123	UPRT20E-BC01	2	Tissue	X						Freshwater zone
11.14.12	1127	UPRT20E-BC02	3	Tissue	X						Freshwater zone
Total Number of Containers			15/47	Purchase Order / Statement of Work #2012-0043							
1) <u>Released by:</u>  Company: Windward Environmental Date/Time: 11.15.12/0730 <u>Rec'd by:</u> Company: EcoAnalysts Date/Time:	2) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	3) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	4) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	5) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:							

To be completed by Laboratory upon sample receipt:



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 Suite 401
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 Tel: (206) 378-1364
 Fax: (206) 217-9343

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name:	Passaic RI/FS Background and Ref Sediment	Ship to:	EcoAnalysts	# UPR-EA111512-2
Project Number:	Task 39.1	Attn:	Shandra McGraw	Shipping Date: 11.15.12
Contact Name:	Karen Tobiason	Shipper:	FedEx Ground	Airbill Number: N/A
Sampled By:	Thai Do	Form filled out by:	T. Do	Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Taxonomy	Test(s) Requested (check test(s) required)					Comments / Instructions [Jar tag number(s)]
11.14.12	1134	UPRT20E-BC03	2	Tissue	X						Freshwater zone
11.14.12	1139	UPRT20E-BC04	2	Tissue	X						Freshwater zone
11.14.12	1206	UPRT20F-BC01	2	Tissue	X						Freshwater zone
11.14.12	1215	UPRT20F-BC02	2	Tissue	X						Freshwater zone
11.14.12	1223	UPRT20F-BC03	2	Tissue	X						Freshwater zone
11.14.12	1234	UPRT20F-BC04	2	Tissue	X						Freshwater zone
11.14.12	1302	UPRT20G-BC01	3	Tissue	X						Freshwater zone
11.14.12	1308	UPRT20G-BC02	3	Tissue	X						Freshwater zone
11.14.12	1314	UPRT20G-BC03	2	Tissue	X						Freshwater zone
11.14.12	1320	UPRT20G-BC04	3	Tissue	X						Freshwater zone
Total Number of Containers			23/47	Purchase Order / Statement of Work #2012-0043							
1) <u>Released by:</u>  Company: Windward Environmental Date/Time: 11.15.12/0730 <u>Rec'd by:</u> Company: EcoAnalysts Date/Time:	2) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	3) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	4) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	5) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:							

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: **Passaic RI/FS Background and Ref Sediment**
Project Number: **Task 39.1**
Contact Name: **Karen Tobiason**
Sampled By: **Thai Do**

Ship to:	EcoAnalysts	# UPR-EA111512-3
Attn:	Shandra McGraw	Shipping Date: 11.15.12
Shipper:	FedEx Ground	Airbill Number: N/A
Form filled out by:	T. Do	Turnaround requested: Standard

To be completed by Laboratory upon sample receipt:



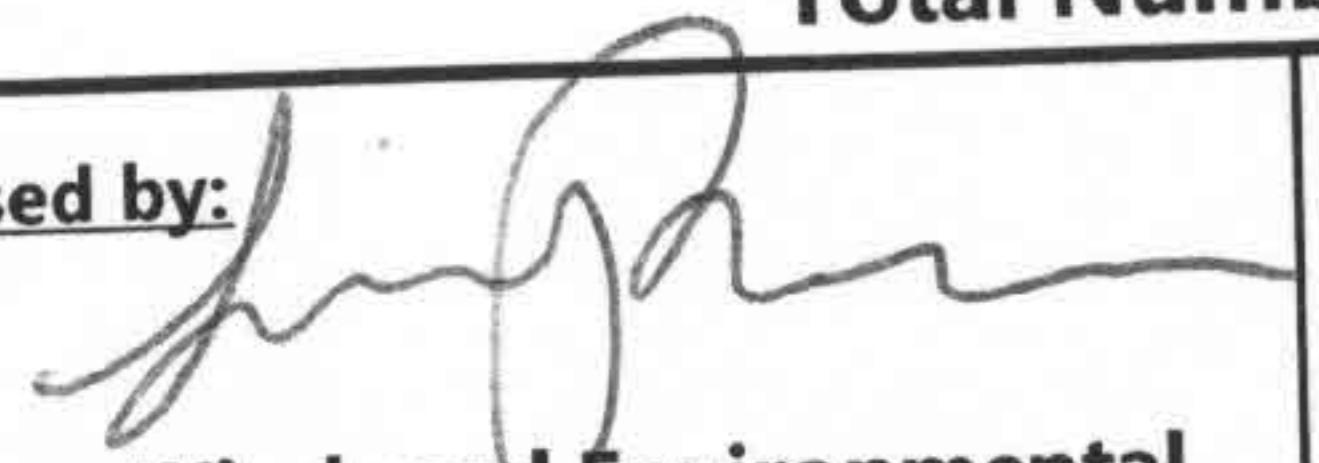
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: **Passaic RI/FS Background and Ref Sediment**
 Project Number: **Task 39.1**
 Contact Name: **Karen Tobaison**
 Sampled By: **Thai Do**

Ship to: **EcoAnalysts** # UPR-EA111612-1
 Attn: **Shandra McGraw** Shipping Date: **11.16.12**
 Shipper: **FedEx Ground** Airbill Number: **N/A**
 Form filled out by: **T. Do** Turnaround requested: **Standard**

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Taxonomy	Test(s) Requested (check test(s) required)					Comments / Instructions [Jar tag number(s)]
11.15.12	0834	UPRT21B-BC01	2	Tissue	X						Freshwater zone
11.15.12	0850	UPRT21B-BC03	3	Tissue	X						Freshwater zone
11.15.12	0859	UPRT21B-BC04	2	Tissue	X						Freshwater zone
11.15.12	0937	UPRT21C-BC01	2	Tissue	X						Freshwater zone
11.15.12	0943	UPRT21C-BC02	2	Tissue	X						Freshwater zone
11.15.12	0951	UPRT21C-BC03	2	Tissue	X						Freshwater zone
11.15.12	0956	UPRT21C-BC04	3	Tissue	X						Freshwater zone
11.15.12	1018	UPRT21D-BC01	2	Tissue	X						Freshwater zone
11.15.12	1022	UPRT21D-BC02	2	Tissue	X						Freshwater zone
11.15.12	1031	UPRT21D-BC04	4	Tissue	X						Freshwater zone
Total Number of Containers					24/66	Purchase Order / Statement of Work #2012-0043					
1) <u>Released by:</u>  Company: Windward Environmental Date/Time: 11.16.12/0730 <u>Rec'd by:</u> Company: EcoAnalysts Date/Time:		2) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:		3) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:			4) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:			5) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	

To be completed by Laboratory upon sample receipt:



200 West Mercer Street
 Suite 401
 Seattle, WA 98119
 Tel: (206) 378-1364
 Fax: (206) 217-9343

Date of receipt:	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: **Passaic RI/FS Background and Ref Sediment**
 Project Number: **Task 39.1**
 Contact Name: **Karen Tobiason**
 Sampled By: **Thai Do**

Ship to:
 Attn:
 Shipper:
 Form filled out by:

EcoAnalysts

Shandra McGraw

FedEx Ground

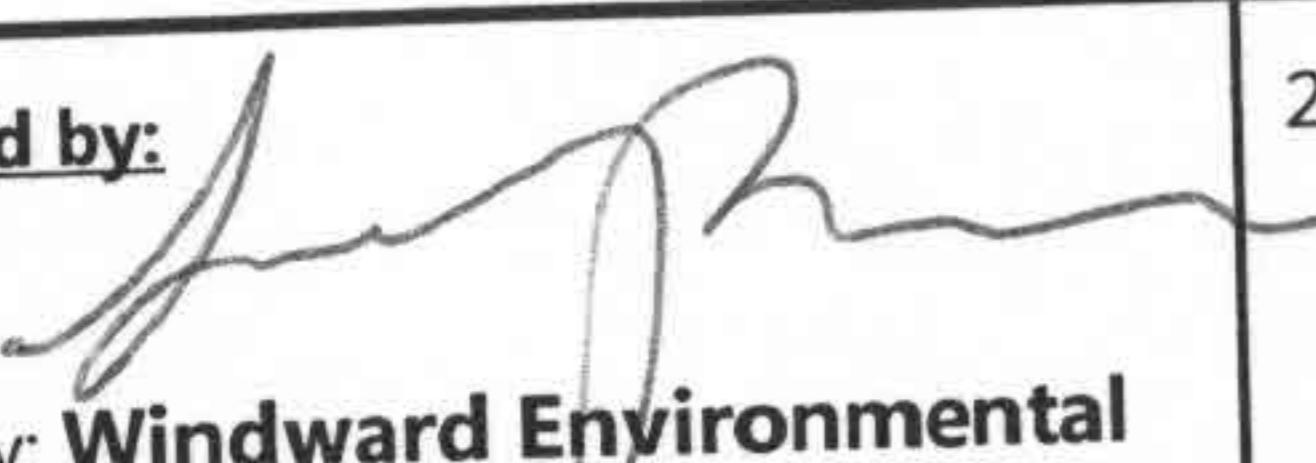
T. Do

UPR-EA111612-2

Shipping Date: **11.16.12**

Airbill Number: **N/A**

Turnaround requested: **Standard**

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Taxonomy	Test(s) Requested (check test(s) required)					Comments / Instructions [Jar tag number(s)]
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11.15.12	1102	UPRT21E-BC01	3	Tissue	X						Freshwater zone
11.15.12	1106	UPRT21E-BC02	3	Tissue	X						Freshwater zone
11.15.12	1111	UPRT21E-BC03	3	Tissue	X						Freshwater zone
11.15.12	1118	UPRT21E-BC04	3	Tissue	X						Freshwater zone
11.15.12	1147	UPRT21F-BC02	2	Tissue	X						Freshwater zone
11.15.12	1155	UPRT21F-BC03	1	Tissue	X						Freshwater zone
11.15.12	1205	UPRT21F-BC04	1	Tissue	X						Freshwater zone
11.15.12	1231	UPRT21G-BC01	6	Tissue	X						Freshwater zone
11.15.12	1235	UPRT21G-BC02	6	Tissue	X						Freshwater zone
11.15.12	1238	UPRT21G-BC03	7	Tissue	X						Freshwater zone
Total Number of Containers					35/66	Purchase Order / Statement of Work #2012-0043					
1) <u>Released by:</u>  Company: Windward Environmental Date/Time: 11.16.12/0730 <u>Rec'd by:</u> Company: EcoAnalysts Date/Time:	2) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	3) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	4) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:	5) <u>Released by:</u> Company: Date/Time: <u>Rec'd by:</u> Company: Date/Time:							

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Passaic RI/FS Background and Ref Sediment

Project/Client Name: Passaic RI/FS Background and Ref Sediment

Project Number: Task 39.1

Contact Name: Karen Tobiason

Sampled By: Thai Do

Ship to:
Attn:
Shipper:
Form filled out by:

EcoAnalysts

UPR-EA111612-3

Shandra McGraw

Shipping Date:

11.16.12

FedEx Ground

Airbill Number:

N/A

T. Do

Turnaround requested: Standard

To be completed by Laboratory upon sample receipt:

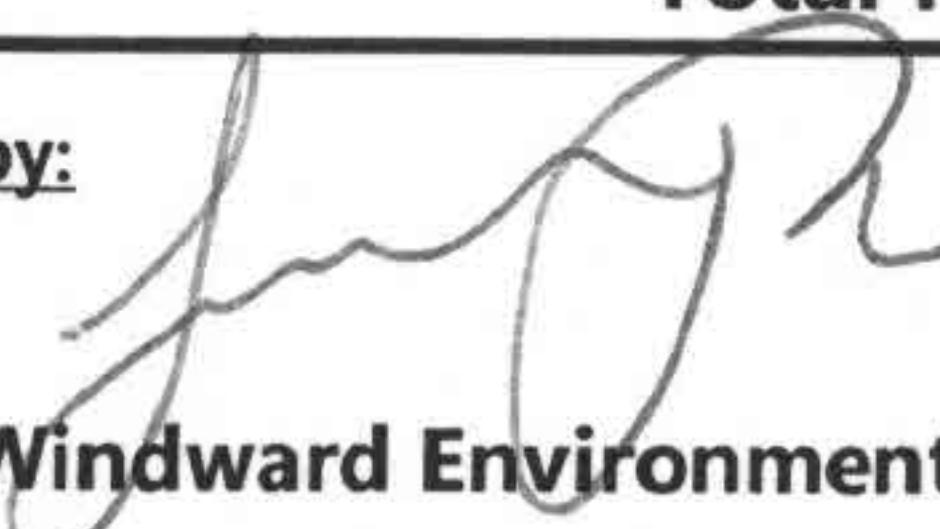


200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name:	Passaic RI/FS Background and Ref Sediment		Ship to:	EcoAnalysts		# UPR-EA111712-1
Project Number:	Task 39.1		Attn:	Shandra McGraw		Shipping Date: 11.17.12
Contact Name:	Karen Tobaison		Shipper:	FedEx Ground		Airbill Number: N/A
Sampled By:	Thai Do		Form filled out by:	T. Do		Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Taxonomy	Test(s) Requested (check test(s) required)					Comments / Instructions [Jar tag number(s)]
11.15.12	0842	UPRT21B-BC02	3	Tissue	X						Freshwater zone
11.15.12	1027	UPRT21D-BC03	3	Tissue	X						Freshwater zone
11.15.12	1142	UPRT21F-BC01	3	Tissue	X						Freshwater zone
11.16.12	0830	UPRT22A-BC01	7	Tissue	X						Freshwater zone
11.16.12	0834	UPRT22A-BC02	5	Tissue	X						Freshwater zone
11.16.12	0838	UPRT22A-BC03	4	Tissue	X						Freshwater zone
11.16.12	0844	UPRT22A-BC04	5	Tissue	X						Freshwater zone
11.16.12	0917	UPRT22B-BC01	7	Tissue	X						Freshwater zone
11.16.12	0926	UPRT22B-BC02	5	Tissue	X						Freshwater zone
11.16.12	0933	UPRT22B-BC03	6	Tissue	X						Freshwater zone
Total Number of Containers			48/55	Purchase Order / Statement of Work #2012-0043							
1) Released by: 	2) Released by:	3) Released by:	4) Released by:	5) Released by:							
Company: Windward Environmental Date/Time: 11.17.12/1030	Company: Date/Time: Rec'd by: Company: EcoAnalysts Date/Time:	Company: Date/Time: Rec'd by: Company: Date/Time:									

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: **Passaic RI/FS Background and Ref Sediment**
Project Number: **Task 39.1**
Contact Name: **Karen Tobiason**
Sampled By: **Thai Do**

Ship to:	EcoAnalysts	# UPR-EA111712-2
Attn:	<u>Shandra McGraw</u>	Shipping Date: <u>11.17.12</u>
Shipper:	<u>FedEx Ground</u>	Airbill Number: <u>N/A</u>
Form filled out by:	T. Do	Turnaround requested: Standard

To be completed by Laboratory upon sample receipt:



200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

APPENDIX G. VOUCHER COLLECTION AND QA/QC DATA (separate ZIP file)

APPENDIX H. TAXONOMY DATA

2012 Benthic Invertebrate Community Reference Data

Appendix H. Counts of Taxa (per Grab Sample)

Location	RM	SampleID	Collection Date	Collection Method	Percent Subsampled	EcoAnalysts SampleID	Annelida																				Bivalvia							
							Hirudinea						Oligochaeta																					
							Alboglossiphonia heteroclita	Desserobdella phalera	Erbobdella sp.	Helobdella elongata	Helobdella sp.	Helobdella stagnalis	Hirudinea total	Arcteonaia lomondi	Aulodrilus limnophilus	Aulodrilus piguetti	Chaetogaster diaphanus	Dero digitata	Enchytraeidae	Ilyodrilus templetoni	Limnodrilus claparedaeianus	Limnodrilus hoffmeisteri	Limnodrilus sp.	Limnodrilus udekemianus	Lumbriculidae	Naididae	Nais sp.	Quistadrilus multisetsosus	Rhyacodrilus sp.	Slavina appendiculata	Specaria josinae	Stylaria lacustris	Tubificidae w/ cap. setae	Tubificidae w/o cap. setae
UPRT18H	17.6	UPRT18H-BC01	11-12-2012	Ponar	83.33	6243.1-1							0	11	11	13	1		27		143		5		44				28		256	2	3	
UPRT18H	17.6	UPRT18H-BC02	11-12-2012	Ponar	66.67	6243.1-2							0	6	2	4				207		8		37						291	2			
UPRT18H	17.6	UPRT18H-BC03	11-12-2012	Ponar	56.25	6243.1-3							0	16	7	13	1			108		4		48						44	241	1		
UPRT18I	17.6	UPRT18I-BC01	11-12-2012	Ponar	37.50	6243.1-4							0	16	29	30	2			123		1		9		1			22		233	4	9	
UPRT18I	17.6	UPRT18I-BC02	11-12-2012	Ponar	25.00	6243.1-5							0	7	49	32	1			134		2		7		4			22		258	8	22	
UPRT18I	17.6	UPRT18I-BC03	11-12-2012	Ponar	58.33	6243.1-6							0	20	48	30	5			102				4		4			25		238	9	6	
UPRT18J	17.6	UPRT18J-BC01	11-12-2012	Ponar	50.00	6243.1-7							0	7	3	6	5			172		12		1		1	1	12		220				
UPRT18J	17.6	UPRT18J-BC02	11-12-2012	Ponar	45.83	6243.1-8							0	7	3	1	5					13		1		5		15	134	184	1			
UPRT18J	17.6	UPRT18J-BC03	11-12-2012	Ponar	29.41	6243.1-9							0	11	2	1	5			148		12		3		20		202	1					
UPRT18K	17.9	UPRT18K-BC01	11-12-2012	Ponar	37.50	6243.1-10							0	3	33	31	5			160		11		1		10		254	10	4				
UPRT18K	17.9	UPRT18K-BC02	11-12-2012	Ponar	62.50	6243.1-11							0	1	36	19	2	12		162		7						239	7	1				
UPRT18K	17.9	UPRT18K-BC03	11-12-2012	Ponar	41.67	6243.1-12							0	4	85	41	8					2		5	3	2	9	88	247	22	3			
UPRT19J	18.1	UPRT19J-BC01	11-13-2012	Ponar	100.00	6243.1-13							0		1					5				3						9				
UPRT19J	18.1	UPRT19J-BC02	11-13-2012	Ponar	100.00	6243.1-14							0																	1	1			
UPRT19J	18.1	UPRT19J-BC03	11-13-2012	Ponar	100.00	6243.1-15							0											2						2	4			
UPRT19K	18.2	UPRT19K-BC01	11-13-2012	Ponar	41.67	6243.1-16							5		5	14	21	11	24	32		108		6		3		33	4		256	1	3	
UPRT19K	18.2	UPRT19K-BC03	11-13-2012	Ponar	100.00	6243.1-17							1	7	8	3	26	12	1	14			120		12		1		7	3	34	233	1	
UPRT19K	18.2	UPRT19K-BC04	11-13-2012	Ponar	73.81	6243.1-18							1		1	3	34	9	3			111		10		4		2	2	3	39	220	1	3
UPRT19L	18.5	UPRT19L-BC02	11-13-2012	Ponar	100.00	6243.1-19							2		2	1		1		7		76		1						86	4			
UPRT19L	18.5	UPRT19L-BC03	11-13-2012	Ponar	50.00	6243.1-20							1		1	32	28	73		11		57				3		5	3	28	240	23	2	
UPRT19L	18.5	UPRT19L-BC04	11-13-2012	Ponar	35.42	6243.1-21							1		1	45	21	42	2		17		94				1		1	3		226	14	3
UPRT19M	18.7	UPRT19M-BC01	11-13-2012	Ponar	37.50	6243.1-22							3		3	7	20	70	3	28		108				13		2	6		257	2	1	
UPRT19M	18.7	UPRT19M-BC02	11-13-2012	Ponar	33.33	6243.1-23							0	27	29	64	9		12	29		61		1		20		4	11	32	258	5		
UPRT19M	18.7	UPRT19M-BC03	11-13-2012	Ponar	100.00	6243.1-24							1	3	4	31	44	98	12		80				18		5	10		327	17	2		
UPRT20A	19	UPRT20A-BC01	11-13-2012	Ponar	37.50	6243.2-1							1		1	9	13	46			26				32		5	9		140	27	2		
UPRT20A	19	UPRT20A-BC02	11-13-2012	Ponar	75.00	6243.2-2							8		8	9	16	41			21				33		8	10		138	29	1		
UPRT20A	19	UPRT20A-BC03	11-13-2012	Ponar	100.00	6243.2-3							20		20	10	4	17			23				36		2	7	99	20	1			
UPRT20B	19	UPRT20B-BC01																																

2012 Benthic Invertebrate Community Reference Data

Appendix H. Counts of Taxa (per Grab Sample)

Location	RM	SampleID	Collection Date	Collection Method	Percent Subsampled	EcoAnalysts SampleID	Annelida																			Bivalvia												
							Hirudinea						Oligochaeta																									
							Alboglossiphonia heteroclitia	Desserobdella phalera	Erpobdella sp.	Helobdella elongata	Helobdella sp.	Helobdella stagnalis	Hirudinea total	Arcteonais lomondi	Aulodrilus limnobius	Aulodrilus pigueti	Chaetogaster diaphanus	Dero digitata	Enchytraeidae	Ilyodrilus templetoni	Limnodrilus claparedaeianus	Limnodrilus hoffmeisteri	Limnodrilus sp.	Limnudrilus udekemianus	Lumbriculidae	Naididae	Nais sp.	Quistadrillus multisetosus	Rhyacodrilus sp.	Slavina appendiculata	Specaria josinae	Stylaria lacustris	Tubificidae w/ cap. setae	Tubificidae w/o cap. setae	Oligochaeta total	Corbicula sp.	Pisidium sp.	Sphaeridae
UPRT20F	19.6	UPRT20F-BC01	11-14-2012	Ponar	90.48	6243.2-16		1					1	17	20	7	1					81				10	1	8	145	13	9							
UPRT20F	19.6	UPRT20F-BC02	11-14-2012	Ponar	65.48	6243.2-17							0	17	55	28			26		82					5	2	1	216	6	3							
UPRT20F	19.6	UPRT20F-BC03	11-14-2012	Ponar	85.71	6243.2-18							1	1	7	22	7				56				10	1	1	112	5	4								
UPRT20G	19.8	UPRT20G-BC01	11-14-2012	Ponar	50.00	6243.2-19							0	12	27	42		5	14	114	3				45	11	1	274	1									
UPRT20G	19.8	UPRT20G-BC02	11-14-2012	Ponar	75.00	6243.2-20							0	15	20	30		5		118	30				16	26	1	20	281									
UPRT20G	19.8	UPRT20G-BC03	11-14-2012	Ponar	25.00	6243.2-21							0	11	30	56		3	35	123	1				13	18	8		298	1								
UPRT21A	20	UPRT21A-BC01	11-14-2012	Ponar	31.25	6243.2-22							0	3	53	77			5							9	11	17	102	277								
UPRT21A	20	UPRT21A-BC02	11-14-2012	Ponar	100.00	6243.2-23							0	2	46	46			11	46	70					3	2	1	227	2	3							
UPRT21A	20	UPRT21A-BC03	11-14-2012	Ponar	100.00	6243.2-24							0	5	50	54		1	1	4	44	44				5	18	24	250	2	2							
UPRT21B	20	UPRT21B-BC01	11-15-2012	Ponar	73.81	6243.2-25							0	3		1		5	1	12	211					81	22	1	337									
UPRT21B	20	UPRT21B-BC02	11-15-2012	Ponar	54.76	6243.2-26							0	3		3		6			135					137	13	2	299	1	1							
UPRT21B	20	UPRT21B-BC03	11-15-2012	Ponar	20.83	6243.2-27							1		1	4		5	21	201	3					41	11		287									
UPRT21C	20.2	UPRT21C-BC01	11-15-2012	Ponar	39.58	6243.2-28							2	2	3	57	3	12	4		57	16				15	6	2	10	184	6	12						
UPRT21C	20.2	UPRT21C-BC02	11-15-2012	Ponar	66.67	6243.2-29							1	12	13	83		19	9		44					23	10	1	18	209	11	11						
UPRT21C	20.2	UPRT21C-BC03	11-15-2012	Ponar	100.00	6243.2-30							1	6	1	8	14		6	11		34				14	5	5	4	93	5	5						
UPRT21D	20.3	UPRT21D-BC01	11-15-2012	Ponar	100.00	6243.2-31							5		5	4	3	12			36					46	12		1	114	2	3						
UPRT21D	20.3	UPRT21D-BC02	11-15-2012	Ponar	75.00	6243.2-32							32		32	10	16	31		4	70					1	65	48	1	6	252	2	1					
UPRT21D	20.3	UPRT21D-BC03	11-15-2012	Ponar	29.17	6243.2-33							17		17	4	13	33		4	40					53	189	1	1	338	3							
UPRT21E	20.4	UPRT21E-BC01	11-15-2012	Ponar	100.00	6243.2-34							0	2	60	41				146		1		10	9	2	6	277										
UPRT21E	20.4	UPRT21E-BC02	11-15-2012	Ponar	100.00	6243.2-35							0	5	51	34				117					3	5	1	3	219	3								
UPRT21E	20.4	UPRT21E-BC03	11-15-2012	Ponar	100.00	6243.2-36							0	2	58	69		1		110					10	4		1	255	5	3							
UPRT21F	20.6	UPRT21F-BC01	11-15-2012	Ponar	100.00	6243.2-37							1	1	6	12	44		2		118	8				13			11	214	4	5						
UPRT21F	20.6	UPRT21F-BC02	11-15-2012	Ponar	26.79	6243.2-38							0	9	35	107		1	15	122	2				12	2	1		306	2	6							
UPRT21F	20.6	UPRT21F-BC03	11-15-2012	Ponar	100.00	6243.2-39							0	11	28	78			19	104	4				14	2			260	3	13							
UPRT21G	20.7	UPRT21G-BC01	11-15-2012	Ponar	100.00	6243.2-40							0	1	8	13									2		1	1	17	43	26	3						
UPRT21G	20.7	UPRT21G-BC02	11-15-2012	Ponar	100.00	6243.2-41							0		14	12				35					2	1	1	5	70	27	7							
UPRT21G	20.7	UPRT21G-BC03	11-15-2012	Ponar	100.00	6243.2-42							0		3	4				21					1				29	32								
UPRT22A	21.1	UPRT22A-BC01	11-16-2012	Ponar	100.00	6243.2-43							0						5						1				6	46	1							
UPRT22A	21.1	UPRT22A-BC02	11-16-2012	Ponar	100.00	6243.2-44							2		2	14									1	12			2	26	55	155						
UPRT22A	21.1	UPRT22A-BC03	11-16-2012	Ponar	100.00	6243.2-45							2		2	3									4				8	15	88	1						
UPRT22B	21.1	UPRT22B-BC01	11-16-2012	Ponar	100.00	6243.2-46							1		1	1									2		1	1	5	75								
UPRT22B	21.1	UPRT22B-BC02	11-16-2012	Ponar	100.00	6243.2-47							0												2				2	5	71	3						
UPRT22B	21.1	UPRT22B-BC03	11-16-2012	Ponar	100.00	6243.2-48							7		7										2				1	3	6	68	2					

Note: the counts in the table are not corrected for laboratory subsampling. Counts are presented on a per-replicate basis (rather than averaged across replicates from the location).

2012 Benthic Invertebrate Community Reference Data

Appendix H. Counts of Taxa (per Grab Sample)

Location	RM	SampleID	Collection Date	Collection Method	Percent Subsampled	EcoAnalysts SampleID	Bivalvia total	Mollusca										Crustaceans						Diptera												
								Gastropoda										Crustaceans						Diptera												
								Ferrissia sp.	Gyraulus sp.	Hydrobiidae	Laevapex fuscus	Lymnaeidae	Micromenetus sp.	Physa sp.	Planorbidae	Valvata bicarinata	Valvata sp.	Gastropoda total	Amphipoda	Gammaidae	Physa sp.	Crustacea total	Bezzia/Palpomyia sp.	Ceratopogoninae	Ablabesmyia mallochi	Ablabesmyia sp.	Chironomus sp.	Cladopelma sp.	Clinotanypus sp.	Cricotopus bicinctus gr.	Cricotopus sp.	Cryptochironomus sp.	Cryptotendipes sp.	Dicotendipes fumidus	Dicotendipes leucoscelis	Dicotendipes modestus
UPRT18H	17.6	UPRT18H-BC01	11-12-2012	Ponar	83.33	6243.1-1	5											0	1				1	1												
UPRT18H	17.6	UPRT18H-BC02	11-12-2012	Ponar	66.67	6243.1-2	2											0					0													
UPRT18H	17.6	UPRT18H-BC03	11-12-2012	Ponar	56.25	6243.1-3	1	1										1					0													
UPRT18I	17.6	UPRT18I-BC01	11-12-2012	Ponar	37.50	6243.1-4	13											0	2				2													
UPRT18I	17.6	UPRT18I-BC02	11-12-2012	Ponar	25.00	6243.1-5	30											0	1				1	2												
UPRT18I	17.6	UPRT18I-BC03	11-12-2012	Ponar	58.33	6243.1-6	15											0	2				1	3												
UPRT18J	17.6	UPRT18J-BC01	11-12-2012	Ponar	50.00	6243.1-7	0										1	1				1														
UPRT18J	17.6	UPRT18J-BC02	11-12-2012	Ponar	45.83	6243.1-8	1										0					0														
UPRT18J	17.6	UPRT18J-BC03	11-12-2012	Ponar	29.41	6243.1-9	1										0	2				2														
UPRT18K	17.9	UPRT18K-BC01	11-12-2012	Ponar	37.50	6243.1-10	14										0					0														
UPRT18K	17.9	UPRT18K-BC02	11-12-2012	Ponar	62.50	6243.1-11	8										0					0														
UPRT18K	17.9	UPRT18K-BC03	11-12-2012	Ponar	41.67	6243.1-12	25	1								1		2	1		1															
UPRT19J	18.1	UPRT19J-BC01	11-13-2012	Ponar	100.00	6243.1-13	0										0	2				2														
UPRT19J	18.1	UPRT19J-BC02	11-13-2012	Ponar	100.00	6243.1-14	0										0					0														
UPRT19J	18.1	UPRT19J-BC03	11-13-2012	Ponar	100.00	6243.1-15	0										0					0														
UPRT19K	18.2	UPRT19K-BC01	11-13-2012	Ponar	41.67	6243.1-16	4	2								9		11	1		1															
UPRT19K	18.2	UPRT19K-BC03	11-13-2012	Ponar	100.00	6243.1-17	1	2								4	5	11			2	2														
UPRT19K	18.2	UPRT19K-BC04	11-13-2012	Ponar	73.81	6243.1-18	4	3	5							8	4	20	2		2	1	1													
UPRT19L	18.5	UPRT19L-BC02	11-13-2012	Ponar	100.00	6243.1-19	4										0	1				1														
UPRT19L	18.5	UPRT19L-BC03	11-13-2012	Ponar	50.00	6243.1-20	25									1		1	2		2	1														
UPRT19L	18.5	UPRT19L-BC04	11-13-2012	Ponar	35.42	6243.1-21	17	1								2		3	1		6	7														
UPRT19M	18.7	UPRT19M-BC01	11-13-2012	Ponar	37.50	6243.1-22	3									0					0															
UPRT19M	18.7	UPRT19M-BC02	11-13-2012	Ponar	33.33	6243.1-23	5									0		1			2	3														
UPRT19M	18.7	UPRT19M-BC03	11-13-2012	Ponar	100.00	6243.1-24	19									1		1	2		2															
UPRT20A	19	UPRT20A-BC01	11-13-2012	Ponar	37.50	6243.2-1	29									0					0															
UPRT20A	19	UPRT20A-BC02	11-13-2012	Ponar	75.00	6243.2-2	30									0					1	1														
UPRT20A	19	UPRT20A-BC03	11-13-2012	Ponar	100.00	6243.2-3	21									0		1	1	2																
UPRT20B	19	UPRT20B-BC01	11-13-2012	Ponar	22.92	6243.2-4	4									0		1		9	10															
UPRT20B	19	UPRT20B-BC03	11-13-2012	Ponar	58.33	6243.2-5	4																													

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Appendix H. Counts of Taxa (per Grab Sample)

Note: the counts in the table are not corrected for laboratory subsampling. Counts are presented on a per-rep

2012 Benthic Invertebrate Community Reference Data

Appendix H. Counts of Taxa (per Grab Sample)

Location	RM	SampleID	Collection Date	Collection Method	Percent Subsampled	EcoAnalysts SampleID	Arthropoda																									
							Insecta																									
							Diptera-Chironomidae																									
Dicrotendipes neomodestus	Dicrotendipes sp.	Einfeldia natchitocheae	Glyptotendipes sp.	Larsia sp.	Nanocladius sp.	Orthocladius complex	Orthocladius sp.	Parachironomus sp.	Parametriocnemus sp.	Phaenopsectra sp.	Polypedilum halterale gr.	Polypedilum scalaenum gr.	Polypedilum sp.	Procladius sp.	Rheotanytarsus exiguius gr.	Stenochironomus sp.	Tanytarsini	Tanytarsus sp.	Thienemannimyia gr. sp.	Diptera total	Callibaetis sp.	Stenacron sp.	Cheumatopsyche sp.	Hydropsyche sp.	Hydropsilia sp.	Hydrotillidae	Mystacides sepulchralis	Oecetis sp.	Oxyethira sp.	EPT total	Ancyronyx variegatus	
UPRT18H	17.6	UPRT18H-BC01	11-12-2012	Ponar	83.33	6243.1-1		1												3	9	142						1	1	1		
UPRT18H	17.6	UPRT18H-BC02	11-12-2012	Ponar	66.67	6243.1-2														15		12	101						0	0	0	
UPRT18H	17.6	UPRT18H-BC03	11-12-2012	Ponar	56.25	6243.1-3														12	3	4	95						1	1	1	
UPRT18I	17.6	UPRT18I-BC01	11-12-2012	Ponar	37.50	6243.1-4		1												3	14		109						1	1	1	
UPRT18I	17.6	UPRT18I-BC02	11-12-2012	Ponar	25.00	6243.1-5														8	22		87						0	0	0	
UPRT18I	17.6	UPRT18I-BC03	11-12-2012	Ponar	58.33	6243.1-6														8		9	92						0	0	0	
UPRT18J	17.6	UPRT18J-BC01	11-12-2012	Ponar	50.00	6243.1-7																						126	0	0		
UPRT18J	17.6	UPRT18J-BC02	11-12-2012	Ponar	45.83	6243.1-8		1												1									131	0	0	
UPRT18J	17.6	UPRT18J-BC03	11-12-2012	Ponar	29.41	6243.1-9																						109	0	0		
UPRT18K	17.9	UPRT18K-BC01	11-12-2012	Ponar	37.50	6243.1-10		3	2											1	3		3					83	0	0		
UPRT18K	17.9	UPRT18K-BC02	11-12-2012	Ponar	62.50	6243.1-11			1												2	1	1	84						1	1	1
UPRT18K	17.9	UPRT18K-BC03	11-12-2012	Ponar	41.67	6243.1-12														11	2		111						2	2	2	
UPRT19J	18.1	UPRT19J-BC01	11-13-2012	Ponar	100.00	6243.1-13														12	1		65						0	0	0	
UPRT19J	18.1	UPRT19J-BC02	11-13-2012	Ponar	100.00	6243.1-14														2		1	14						0	0	0	
UPRT19J	18.1	UPRT19J-BC03	11-13-2012	Ponar	100.00	6243.1-15		1												11	5		52						0	0	0	
UPRT19K	18.2	UPRT19K-BC01	11-13-2012	Ponar	41.67	6243.1-16		6		1										25	4	12	70						1	6	1	
UPRT19K	18.2	UPRT19K-BC03	11-13-2012	Ponar	100.00	6243.1-17		8	5	1	1									9		11	59						2	2	2	
UPRT19K	18.2	UPRT19K-BC04	11-13-2012	Ponar	73.81	6243.1-18		5	5										2	5		11	65						4	4	4	
UPRT19L	18.5	UPRT19L-BC02	11-13-2012	Ponar	100.00	6243.1-19													5	2		6	45						0	0	0	
UPRT19L	18.5	UPRT19L-BC03	11-13-2012	Ponar	50.00	6243.1-20		3											28	22		39	152						4	1	1	
UPRT19L	18.5	UPRT19L-BC04	11-13-2012	Ponar	35.42	6243.1-21		2											5	10		52	123						11	2	1	
UPRT19M	18.7	UPRT19M-BC01	11-13-2012	Ponar	37.50	6243.1-22			1										13	5		2	52						1	1	1	
UPRT19M	18.7	UPRT19M-BC02	11-13-2012	Ponar	33.33	6243.1-23													10	2	1	5	54						0	0	0	
UPRT19M	18.7	UPRT19M-BC03	11-13-2012	Ponar	100.00	6243.1-24													33	10		8	90						1	1	2	
UPRT20A	19	UPRT20A-BC01	11-13-2012	Ponar	37.50	6243.2-1														117		4	134						1	1	1	
UPRT20A	19	UPRT20A-BC02	11-13-2012	Ponar	75.00	6243.2-2														146	1	8	168						0	0	0	
UPRT20A	19	UPRT20A-BC03	11-13-2012	Ponar	100.00	6243.2-3		1												58			70						0	0	0	
UPRT20B	19	UPRT20B-BC01	11-13-2012	Ponar	22.92	6243.2-4													1	71		20	115						2	2	2	
UPRT20B	19	UPRT20B-BC03	11-13-2012	Ponar	58.33	6243.2-5													1	11		9	54						1	2	2	
UPRT20B	19	UPRT20B-BC04	11-13-2012	Ponar	50.00	6243.2-6													1		27	1	4	53						0	0	0
UPRT20C	19.3	UPRT20C-BC01	11-14-2012	Ponar	100.00	6243.2-7														36			38						0	0	0	
UPRT20C	19.3	UPRT20C-BC02	11-14-2012	Ponar	100.00	6243.2-8														46			49						0	0	0	
UPRT20C	19.3	UPRT20C-BC03	11-14-2012	Ponar	100.00	6243.2-9														40	2		50						1	1	1	
UPRT20D	19.3	UPRT20D-BC01	11-14-2012	Ponar	50.00	6243.2-10													1	49	1	9	69						3	4	7	
UPRT20D	19.3	UPRT20D-BC02	11-14-2012	Ponar	70.83	6243.2-11														59	1	30	106						2	2	4	
UPRT20D	19.3	UPRT20D-BC03	11-14-2012	Ponar	43.75	6243.2-12		1											8		25	2	22	85						8	1	10
UPRT20E	19.6	UPRT20E-BC01	11-14-2012	Ponar	100.00	6243.2-13														7	13		6	34						3	4	7
UPRT20E	19.6	UPRT20E-BC02	11-14-2012	Ponar	50.00	6243.2-14		3												8	31		14	74						11	2	11
UPRT20E	19.6	UPRT20E-BC03	11-14-2012	Ponar	100.00	6243.2-15														8	4		22						2	2	2	

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2012 Benthic Invertebrate Community Reference Data

Appendix H. Counts of Taxa (per Grab Sample)

Location	RM	SampleID	Collection Date	Collection Method	Percent Subsampled	EcoAnalysts SampleID	Arthropoda																				EPT (Ephemeroptera/Trichoptera)						EPT total	
							Insecta																											
							Diptera-Chironomidae																											
							Dicrotendipes neomodestus	Dicrotendipes sp.	Einfeldia natchitochae	Glyptotendipes sp.	Larsia sp.	Nanocadius sp.	Orthocladius complex	Orthocladius sp.	Parachironomus sp.	Parametriocnemus sp.	Phaenopsectra sp.	Polypedilum halterale gr.	Polypedilum scalaenum gr.	Procladius sp.	Rheotanytarsus exiguus gr.	Stenochironomus sp.	Tanytarsus sp.	Tanytarsini	Tanytarsus sp.	Thienemannimyia gr. sp.	Diptera total	Callibaetis sp.	Stenacron sp.	Cheumatopsyche sp.	Hydropsyche sp.	Hydropsyche sp.	Mystacides sepulchralis	Oecetis sp.
UPRT20F	19.6	UPRT20F-BC01	11-14-2012	Ponar	90.48	6243.2-16						1						5		61					1	107					7	4	11	
UPRT20F	19.6	UPRT20F-BC02	11-14-2012	Ponar	65.48	6243.2-17						5						10		35					4	86					7	3	10	
UPRT20F	19.6	UPRT20F-BC03	11-14-2012	Ponar	85.71	6243.2-18						7						2		44					3	97					16	7	23	
UPRT20G	19.8	UPRT20G-BC01	11-14-2012	Ponar	50.00	6243.2-19														9							45						0	0
UPRT20G	19.8	UPRT20G-BC02	11-14-2012	Ponar	75.00	6243.2-20													1		23						37						0	0
UPRT20G	19.8	UPRT20G-BC03	11-14-2012	Ponar	25.00	6243.2-21												3		12						30						0	0	
UPRT21A	20	UPRT21A-BC01	11-14-2012	Ponar	31.25	6243.2-22												4		4					2	47					1	1		
UPRT21A	20	UPRT21A-BC02	11-14-2012	Ponar	100.00	6243.2-23		1										1	3							36						0	0	
UPRT21A	20	UPRT21A-BC03	11-14-2012	Ponar	100.00	6243.2-24												7		2					1	24						0	0	
UPRT21B	20	UPRT21B-BC01	11-15-2012	Ponar	73.81	6243.2-25						1							30							37					2	2		
UPRT21B	20	UPRT21B-BC02	11-15-2012	Ponar	54.76	6243.2-26													16							23					5	5		
UPRT21B	20	UPRT21B-BC03	11-15-2012	Ponar	20.83	6243.2-27													20							25						0	0	
UPRT21C	20.2	UPRT21C-BC01	11-15-2012	Ponar	39.58	6243.2-28						5							81							87					1	8	9	
UPRT21C	20.2	UPRT21C-BC02	11-15-2012	Ponar	66.67	6243.2-29						3	1					4		73	6					91					10	7	17	
UPRT21C	20.2	UPRT21C-BC03	11-15-2012	Ponar	100.00	6243.2-30	1										1		30						32					7	1	8		
UPRT21D	20.3	UPRT21D-BC01	11-15-2012	Ponar	100.00	6243.2-31													40							49					1	2	3	
UPRT21D	20.3	UPRT21D-BC02	11-15-2012	Ponar	75.00	6243.2-32													15							20						0	0	
UPRT21D	20.3	UPRT21D-BC03	11-15-2012	Ponar	29.17	6243.2-33													20							1					1	1		
UPRT21E	20.4	UPRT21E-BC01	11-15-2012	Ponar	100.00	6243.2-34												1							78						0	0		
UPRT21E	20.4	UPRT21E-BC02	11-15-2012	Ponar	100.00	6243.2-35												4							31						0	0		
UPRT21E	20.4	UPRT21E-BC03	11-15-2012	Ponar	100.00	6243.2-36												1							65						0	0		
UPRT21F	20.6	UPRT21F-BC01	11-15-2012	Ponar	100.00	6243.2-37	1											20		1					49					1	2	3		
UPRT21F	20.6	UPRT21F-BC02	11-15-2012	Ponar	26.79	6243.2-38											4		8					26					3	1	1			
UPRT21F	20.6	UPRT21F-BC03	11-15-2012	Ponar	100.00	6243.2-39												10							28					1	1	2		
UPRT21G	20.7	UPRT21G-BC01	11-15-2012	Ponar	100.00	6243.2-40																		1		9				0	0			
UPRT21G	20.7	UPRT21G-BC02	11-15-2012	Ponar	100.00	6243.2-41												2							10						1	1		
UPRT21G	20.7	UPRT21G-BC03	11-15-2012	Ponar	100.00	6243.2-42											3	1							13						0	0		
UPRT22A	21.1	UPRT22A-BC01	11-16-2012	Ponar	100.00	6243.2-43	6																	1		15				2	2			
UPRT22A	21.1	UPRT22A-BC02	11-16-2012	Ponar	100.00	6243.2-44	9										1	7						1		39				1	1			
UPRT22A	21.1	UPRT22A-BC03	11-16																															

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Appendix H. Counts of Taxa (per Grab Sample)

Location	RM	SampleID	Collection Date	Collection Method	Percent Subsampled	EcoAnalysts SampleID	Arachnida														Total					
							Other Insects						Acari						Other Taxa							
							Berosus sp.	Dubiraphia sp.	Stenelmis sp.	Coenagrionidae	Macromiidae	Corixidae	Other insects total	Arrenurus sp.	Hygrobaetes sp.	Koenikea sp.	Lebertia sp.	Limnesia sp.	Neumania sp.	Oribatei	Oxus sp.	Acar total	Turbellaria	Prostoma sp.	Nematoda	Other taxa total
UPRT18H	17.6	UPRT18H-BC01	11-12-2012	Ponar	83.33	6243.1-1							0									14	14	14	419	
UPRT18H	17.6	UPRT18H-BC02	11-12-2012	Ponar	66.67	6243.1-2							0		2							2	4	1	9	401
UPRT18H	17.6	UPRT18H-BC03	11-12-2012	Ponar	56.25	6243.1-3							0		2							2	6	1	11	348
UPRT18I	17.6	UPRT18I-BC01	11-12-2012	Ponar	37.50	6243.1-4							0		2							2	3	7	7	363
UPRT18I	17.6	UPRT18I-BC02	11-12-2012	Ponar	25.00	6243.1-5							0		0							0	1		1	378
UPRT18I	17.6	UPRT18I-BC03	11-12-2012	Ponar	58.33	6243.1-6							2		1		1					2	3	5	9	357
UPRT18J	17.6	UPRT18J-BC01	11-12-2012	Ponar	50.00	6243.1-7							0		0							0	2	3	5	353
UPRT18J	17.6	UPRT18J-BC02	11-12-2012	Ponar	45.83	6243.1-8							0		0							0	12	1	13	329
UPRT18J	17.6	UPRT18J-BC03	11-12-2012	Ponar	29.41	6243.1-9							2		1		1					0	6	1	7	323
UPRT18K	17.9	UPRT18K-BC01	11-12-2012	Ponar	37.50	6243.1-10							0		1		1					1	1	1	3	353
UPRT18K	17.9	UPRT18K-BC02	11-12-2012	Ponar	62.50	6243.1-11							0		1		1					1	1	1	4	335
UPRT18K	17.9	UPRT18K-BC03	11-12-2012	Ponar	41.67	6243.1-12							0		1		1					1	2	1	4	391
UPRT19J	18.1	UPRT19J-BC01	11-13-2012	Ponar	100.00	6243.1-13							0		0		1					3	4	2	10	82
UPRT19J	18.1	UPRT19J-BC02	11-13-2012	Ponar	100.00	6243.1-14							0		0		1					0	0	0	0	15
UPRT19J	18.1	UPRT19J-BC03	11-13-2012	Ponar	100.00	6243.1-15							0		0		1					1	1	2	57	
UPRT19K	18.2	UPRT19K-BC01	11-13-2012	Ponar	41.67	6243.1-16							0		2		2					2	4	32	5	45
UPRT19K	18.2	UPRT19K-BC03	11-13-2012	Ponar	100.00	6243.1-17							0		0		0					0	20	13	33	349
UPRT19K	18.2	UPRT19K-BC04	11-13-2012	Ponar	73.81	6243.1-18							1		1		1					0	22	8	30	347
UPRT19L	18.5	UPRT19L-BC02	11-13-2012	Ponar	100.00	6243.1-19							0		0		0					0	1	1	2	140
UPRT19L	18.5	UPRT19L-BC03	11-13-2012	Ponar	50.00	6243.1-20							0		4		4					2	4	14	437	
UPRT19L	18.5	UPRT19L-BC04	11-13-2012	Ponar	35.42	6243.1-21							1		2		2					2	2	3	9	399
UPRT19M	18.7	UPRT19M-BC01	11-13-2012	Ponar	37.50	6243.1-22							0		0		1					1	1	2	4	319
UPRT19M	18.7	UPRT19M-BC02	11-13-2012	Ponar	33.33	6243.1-23							0		0		1					1	2	8	326	
UPRT19M	18.7	UPRT19M-BC03	11-13-2012	Ponar	100.00	6243.1-24							0		0		0					0	6	1	7	452
UPRT20A	19	UPRT20A-BC01	11-13-2012	Ponar	37.50	6243.2-1							1		1		1					1	1	2	2	307
UPRT20A	19	UPRT20A-BC02	11-13-2012	Ponar	75.00	6243.2-2							0		1		1					1	1	2	2	346
UPRT20A	19	UPRT20A-BC03	11-13-2012	Ponar	100.00	6243.2-3							1		1		0					0	0	0	0	213
UPRT20B	19	UPRT20B-BC01	11-13-2012	Ponar	22.92	6243.2-4							0		1		1					1	1	4	7	399
UPRT20B	19	UPRT20B-BC03	11-13-2012	Ponar	58.33	6243.2-5							0		0		0					0	1	3	3	332
UPRT20B	19	UPRT20B-BC04	11-13-2012	Ponar	50.00	6243.2-6							0		0		0					0	1	1	2	304
UPRT20C	19.3	UPRT20C-BC01	11-14-2012	Ponar	100.00	6243.2-7							0		0		1					1	1	7	9	204
UPRT20C	19.3	UPRT20C-BC02	11-14-2012	Ponar	100.00	6243.2-8							0		0		1					0	2	1	1	190
UPRT20C	19.3	UPRT20C-BC03	11-14-2012	Ponar	100.00	6243.2-9							0		3		1					1	1	2	2	179
UPRT20D	19.3	UPRT20D-BC01	11-14-2012	Ponar	50.00	6243.2-10							1		3		2					5	5	17	32	351
UPRT20D	19.3	UPRT20D-BC02	11-14-2012	Ponar	70.83	6243.2-11							0		1		3					5	3	31	44	396
UPRT20D	19.3	UPRT20D-BC03	11-14-2012	Ponar	43.75	6243.2-12																				

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Appendix H. Counts of Taxa (per Grab Sample)

Location	RM	SampleID	Collection Date	Collection Method	Percent Subsampled	EcoAnalysts SampleID	Arachnida														Total			
							Other Insects						Acari							Other Taxa				
							Berosus sp.	Dubiraphia sp.	Stenelmis sp.	Coenagrionidae	Macromiidae	Corixidae	Other insects total	Arrenurus sp.	Hygrobaetes sp.	Koenikea sp.	Lebertia sp.	Limnesia sp.	Neumania sp.	Oribatei	Oxus sp.	Acaris total	Turbellaria	Prostoma sp.
UPRT20F	19.6	UPRT20F-BC01	11-14-2012	Ponar	90.48	6243.2-16							0											361
UPRT20F	19.6	UPRT20F-BC02	11-14-2012	Ponar	65.48	6243.2-17			1				2											397
UPRT20F	19.6	UPRT20F-BC03	11-14-2012	Ponar	85.71	6243.2-18							0											318
UPRT20G	19.8	UPRT20G-BC01	11-14-2012	Ponar	50.00	6243.2-19							2											323
UPRT20G	19.8	UPRT20G-BC02	11-14-2012	Ponar	75.00	6243.2-20							2											331
UPRT20G	19.8	UPRT20G-BC03	11-14-2012	Ponar	25.00	6243.2-21							0											331
UPRT21A	20	UPRT21A-BC01	11-14-2012	Ponar	31.25	6243.2-22							0											350
UPRT21A	20	UPRT21A-BC02	11-14-2012	Ponar	100.00	6243.2-23							0											275
UPRT21A	20	UPRT21A-BC03	11-14-2012	Ponar	100.00	6243.2-24							0											287
UPRT21B	20	UPRT21B-BC01	11-15-2012	Ponar	73.81	6243.2-25							3											399
UPRT21B	20	UPRT21B-BC02	11-15-2012	Ponar	54.76	6243.2-26							3											346
UPRT21B	20	UPRT21B-BC03	11-15-2012	Ponar	20.83	6243.2-27							1											330
UPRT21C	20.2	UPRT21C-BC01	11-15-2012	Ponar	39.58	6243.2-28							10											384
UPRT21C	20.2	UPRT21C-BC02	11-15-2012	Ponar	66.67	6243.2-29							7											393
UPRT21C	20.2	UPRT21C-BC03	11-15-2012	Ponar	100.00	6243.2-30							3											169
UPRT21D	20.3	UPRT21D-BC01	11-15-2012	Ponar	100.00	6243.2-31							2											210
UPRT21D	20.3	UPRT21D-BC02	11-15-2012	Ponar	75.00	6243.2-32							0											320
UPRT21D	20.3	UPRT21D-BC03	11-15-2012	Ponar	29.17	6243.2-33							1											402
UPRT21E	20.4	UPRT21E-BC01	11-15-2012	Ponar	100.00	6243.2-34							0											366
UPRT21E	20.4	UPRT21E-BC02	11-15-2012	Ponar	100.00	6243.2-35							0											257
UPRT21E	20.4	UPRT21E-BC03	11-15-2012	Ponar	100.00	6243.2-36							0											336
UPRT21F	20.6	UPRT21F-BC01	11-15-2012	Ponar	100.00	6243.2-37							2											319
UPRT21F	20.6	UPRT21F-BC02	11-15-2012	Ponar	26.79	6243.2-38							3											385
UPRT21F	20.6	UPRT21F-BC03	11-15-2012	Ponar	100.00	6243.2-39							5											342
UPRT21G	20.7	UPRT21G-BC01	11-15-2012	Ponar	100.00	6243.2-40							0											89
UPRT21G	20.7	UPRT21G-BC02	11-15-2012	Ponar	100.00	6243.2-41							0											129
UPRT21G	20.7	UPRT21G-BC03	11-15-2012	Ponar	100.00	6243.2-42							0											92
UPRT22A	21.1	UPRT22A-BC01	11-16-2012	Ponar	100.00	6243.2-43							2											87
UPRT22A	21.1	UPRT22A-BC02	11-16-2012	Ponar	100.00	6243.2-44							3											280
UPRT22A	21.1	UPRT22A-BC03	11-16-2012	Ponar	100.00	6243.2-45							1											157
UPRT22B	21.1	UPRT22B-BC01	11-16-2012	Ponar	100.00	6243.2-46							9											285
UPRT22B	21.1	UPRT22B-BC02	11-16-2012	Ponar	100.00	6243.2-47							5											290
UPRT22B	21.1	UPRT22B-BC03	11-16-2012	Ponar	100.00	6243.2-48							5											307

Note: the counts in the table are not corrected for laboratory subsampling. Counts are presented on a per-rep

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Appendix H. Major Taxonomic Groups (per m²)

Location	SampleID	Collection Date	Collection Method	Percent Subsampled	EcoAnalysts SampleID	Major Taxonomic Group Per Replicate - Corrected Abundance per m ²									
						Annelida		Mollusca		Arthropoda					
						Hirudinea	Oligochaeta	Bivalvia	Gastropoda	Crustacea	Insecta			Other Insects	Arachnida
UPRT18H	UPRT18H-BC01	11-12-2012	Ponar	83.33	6243.1-1	0	6144	120	0	24	3408	24	0	0	
UPRT18H	UPRT18H-BC02	11-12-2012	Ponar	66.67	6243.1-2	0	8730	60	0	0	3030	0	0	0	60
UPRT18H	UPRT18H-BC03	11-12-2012	Ponar	56.25	6243.1-3	0	8569	36	36	0	3378	36	0	0	71
UPRT18I	UPRT18I-BC01	11-12-2012	Ponar	37.50	6243.1-4	0	12427	693	0	107	5813	53	0	0	107
UPRT18I	UPRT18I-BC02	11-12-2012	Ponar	25.00	6243.1-5	0	20640	2400	0	160	6960	0	0	0	
UPRT18I	UPRT18I-BC03	11-12-2012	Ponar	58.33	6243.1-6	0	8160	514	0	103	3154	0	69	0	69
UPRT18J	UPRT18J-BC01	11-12-2012	Ponar	50.00	6243.1-7	0	8800	0	40	40	5040	0	0	0	
UPRT18J	UPRT18J-BC02	11-12-2012	Ponar	45.83	6243.1-8	0	8029	44	0	0	5716	0	0	0	
UPRT18J	UPRT18J-BC03	11-12-2012	Ponar	29.41	6243.1-9	0	13736	68	0	136	7412	0	136	0	
UPRT18K	UPRT18K-BC01	11-12-2012	Ponar	37.50	6243.1-10	0	13547	747	0	0	4427	0	0	0	53
UPRT18K	UPRT18K-BC02	11-12-2012	Ponar	62.50	6243.1-11	0	7648	256	0	0	2688	32	0	0	32
UPRT18K	UPRT18K-BC03	11-12-2012	Ponar	41.67	6243.1-12	0	11856	1200	96	48	5328	96	0	0	48
UPRT19J	UPRT19J-BC01	11-13-2012	Ponar	100.00	6243.1-13	0	180	0	0	40	1300	0	0	0	80
UPRT19J	UPRT19J-BC02	11-13-2012	Ponar	100.00	6243.1-14	0	20	0	0	0	280	0	0	0	
UPRT19J	UPRT19J-BC03	11-13-2012	Ponar	100.00	6243.1-15	0	80	0	0	0	1040	0	0	0	20
UPRT19K	UPRT19K-BC01	11-13-2012	Ponar	41.67	6243.1-16	240	12288	192	528	48	3360	288	0	0	192
UPRT19K	UPRT19K-BC02	11-13-2012	Ponar	100.00	6243.1-17	160	4660	20	220	40	1180	40	0	0	
UPRT19K	UPRT19K-BC04	11-13-2012	Ponar	73.81	6243.1-18	27	5961	108	542	54	1761	108	27	0	
UPRT19L	UPRT19L-BC02	11-13-2012	Ponar	100.00	6243.1-19	40	1720	80	0	20	900	0	0	0	
UPRT19L	UPRT19L-BC03	11-13-2012	Ponar	50.00	6243.1-20	40	9600	1000	40	80	6080	240	0	0	160
UPRT19L	UPRT19L-BC04	11-13-2012	Ponar	35.42	6243.1-21	56	12762	960	169	395	6946	791	56	0	113
UPRT19M	UPRT19M-BC01	11-13-2012	Ponar	37.50	6243.1-22	160	13707	160	0	0	2773	53	0	0	53
UPRT19M	UPRT19M-BC02	11-13-2012	Ponar	33.33	6243.1-23	0	15480	300	0	180	3240	0	0	0	120
UPRT19M	UPRT19M-BC03	11-13-2012	Ponar	100.00	6243.1-24	80	6540	380	20	40	1800	40	0	0	
UPRT20A	UPRT20A-BC01	11-13-2012	Ponar	37.50	6243.2-1	53	7467	1547	0	0	7147	53	53	0	53
UPRT20A	UPRT20A-BC02	11-13-2012	Ponar	75.00	6243.2-2	213	3680	800	0	27	4480	0	0	0	27
UPRT20A	UPRT20A-BC03	11-13-2012	Ponar	100.00	6243.2-3	400	1980	420	0	40	1400	0	20	0	
UPRT20B	UPRT20B-BC01	11-13-2012	Ponar	22.92	6243.2-4	0	22865	349	0	873	10036	175	0	0	87
UPRT20B	UPRT20B-BC03	11-13-2012	Ponar	58.33	6243.2-5	0	9223	137	0	0	1851	69	0	0	
UPRT20B	UPRT20B-BC04	11-13-2012	Ponar	50.00	6243.2-6	0	9360	400	200	0	2120	0	0	0	
UPRT20C	UPRT20C-BC01	11-14-2012	Ponar	100.00	6243.2-7	0	3060	60	20	20	760	0	0	0	20
UPRT20C	UPRT20C-BC02	11-14-2012	Ponar	100.00	6243.2-8	0	2800	0	0	0	980	0	0	0	
UPRT20C	UPRT20C-BC03	11-14-2012	Ponar	100.00	6243.2-9	20	2380	100	20	20	1000	20	0	0	20
UPRT20D	UPRT20D-BC01	11-14-2012	Ponar	50.00	6243.2-10	240	7760	800	560	520	2760	280	40	0	200
UPRT20D	UPRT20D-BC02	11-14-2012	Ponar	70.83	6243.2-11	113	6127	480	198	56	2993	113	0	0	141
UPRT20D	UPRT20D-BC03	11-14-2012	Ponar	43.75	6243.2-12	91	10011	640	640	2149	3886	457	91	0	137
UPRT20E	UPRT20E-BC01	11-14-2012	Ponar	100.00	6243.2-13	240	1520	60	0	20	680	140	40	0	
UPRT20E	UPRT20E-BC02	11-14-2012	Ponar	50.00	6243.2-14	600	6000	120	120	1240	2960	440	40	0	
UPRT20E	UPRT20E-BC03	11-14-2012	Ponar	100.00	6243.2-15	180	580	140	0	0	440	40	0	0	
UPRT20F	UPRT20F-BC01	11-14-2012	Ponar	90.48	6243.2-16	22	3205	486	641	354	2365	243	0	0	221
UPRT20F	UPRT20F-BC02	11-14-2012	Ponar	65.48	6243.2-17	0	6598	275	550	764	2627	305	61	0	92
UPRT20F	UPRT20F-BC03	11-14-2012	Ponar	85.71	6243.2-18	23	2613	210	700	817	2263	537	0	0	163
UPRT20G	UPRT20G-BC01	11-14-2012	Ponar	50.00	6243.2-19	0	10960	40	0	0	1800	0	80	0	
UPRT20G	UPRT20G-BC02	11-14-2012	Ponar	75.00	6243.2-20	0	7493	0	0	53	987	0	53	0	80
UPRT20G	UPRT20G-BC03	11-14-2012	Ponar	25.00	6243.2-21	0	23840	80	0	0	2400	0	0	0	
UPRT21A	UPRT21A-BC01	11-14-2012	Ponar	31.25	6243.2-22	0	17728	64	0	960	3008	64	0	0	
UPRT21A	UPRT21A-BC02	11-14-201													

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Appendix H. Major Taxonomic Groups (per m²)

Location	SampleID	Collection Date	Collection Method	Percent Subsampled	EcoAnalysts SampleID	Per m ²	Average Major Taxonomic Group per Location - Corrected Abundance per m ²												
							Turbellaria	Nemertea	Nematoda	Annelida			Mollusca			Arthropoda			
										Hirudinea	Oligochaeta	Bivalvia	Gastropoda	Crustacea	Insecta	Diptera	EPT	Other Insects	Arachnida
UPRT18H	UPRT18H-BC01	11-12-2012	Ponar	83.33	6243.1-1	336	0	0											
UPRT18H	UPRT18H-BC02	11-12-2012	Ponar	66.67	6243.1-2	120	0	30											
UPRT18H	UPRT18H-BC03	11-12-2012	Ponar	56.25	6243.1-3	213	0	36											
UPRT18I	UPRT18I-BC01	11-12-2012	Ponar	37.50	6243.1-4	160	0	0											
UPRT18I	UPRT18I-BC02	11-12-2012	Ponar	25.00	6243.1-5	80	0	0											
UPRT18I	UPRT18I-BC03	11-12-2012	Ponar	58.33	6243.1-6	0	0	171											
UPRT18J	UPRT18J-BC01	11-12-2012	Ponar	50.00	6243.1-7	80	0	120											
UPRT18J	UPRT18J-BC02	11-12-2012	Ponar	45.83	6243.1-8	524	0	44											
UPRT18J	UPRT18J-BC03	11-12-2012	Ponar	29.41	6243.1-9	408	0	68											
UPRT18K	UPRT18K-BC01	11-12-2012	Ponar	37.50	6243.1-10	0	0	53											
UPRT18K	UPRT18K-BC02	11-12-2012	Ponar	62.50	6243.1-11	32	0	32											
UPRT18K	UPRT18K-BC03	11-12-2012	Ponar	41.67	6243.1-12	96	0	0											
UPRT19J	UPRT19J-BC01	11-13-2012	Ponar	100.00	6243.1-13	0	0	40											
UPRT19J	UPRT19J-BC02	11-13-2012	Ponar	100.00	6243.1-14	0	0	0											
UPRT19J	UPRT19J-BC03	11-13-2012	Ponar	100.00	6243.1-15	0	0	0											
UPRT19K	UPRT19K-BC01	11-13-2012	Ponar	41.67	6243.1-16	1536	0	240											
UPRT19K	UPRT19K-BC03	11-13-2012	Ponar	100.00	6243.1-17	400	0	260											
UPRT19K	UPRT19K-BC04	11-13-2012	Ponar	73.81	6243.1-18	596	0	217											
UPRT19L	UPRT19L-BC02	11-13-2012	Ponar	100.00	6243.1-19	20	0	20											
UPRT19L	UPRT19L-BC03	11-13-2012	Ponar	50.00	6243.1-20	0	80	160											
UPRT19L	UPRT19L-BC04	11-13-2012	Ponar	35.42	6243.1-21	113	0	169											
UPRT19M	UPRT19M-BC01	11-13-2012	Ponar	37.50	6243.1-22	107	0	0											
UPRT19M	UPRT19M-BC02	11-13-2012	Ponar	33.33	6243.1-23	120	120	0											
UPRT19M	UPRT19M-BC03	11-13-2012	Ponar	100.00	6243.1-24	120	20	0											
UPRT20A	UPRT20A-BC01	11-13-2012	Ponar	37.50	6243.2-1	0	0	0											
UPRT20A	UPRT20A-BC02	11-13-2012	Ponar	75.00	6243.2-2	0	0	0											
UPRT20A	UPRT20A-BC03	11-13-2012	Ponar	100.00	6243.2-3	0	0	0											
UPRT20B	UPRT20B-BC01	11-13-2012	Ponar	22.92	6243.2-4	87	0	349											
UPRT20B	UPRT20B-BC03	11-13-2012	Ponar	58.33	6243.2-5	0	0	103											
UPRT20B	UPRT20B-BC04	11-13-2012	Ponar	50.00	6243.2-6	40	0	40											
UPRT20C	UPRT20C-BC01	11-14-2012	Ponar	100.00	6243.2-7	140	0	0											
UPRT20C	UPRT20C-BC02	11-14-2012	Ponar	100.00	6243.2-8	20	0	0											
UPRT20C	UPRT20C-BC03	11-14-2012	Ponar	100.00	6243.2-9	0	0	0											
UPRT20D	UPRT20D-BC01	11-14-2012	Ponar	50.00	6243.2-10	200	0	680											
UPRT20D	UPRT20D-BC02	11-14-2012	Ponar	70.83	6243.2-11	85	0	875											
UPRT20D	UPRT20D-BC03	11-14-2012	Ponar	43.75	6243.2-12	869	0	960											
UPRT20E	UPRT20E-BC01	11-14-2012	Ponar	100.00	6243.2-13	40	0	20											
UPRT20E	UPRT20E-BC02	11-14-2012	Ponar	50.00	6243.2-14	600	80	40											
UPRT20E	UPRT20E-BC03	11-14-2012	Ponar	100.00	6243.2-15	60	0	0											
UPRT20F	UPRT20F-BC01	11-14-2012	Ponar	90.48	6243.2-16	287	44	111											
UPRT20F	UPRT20F-BC02	11-14-2012	Ponar	65.48	6243.2-17	825	31	0											
UPRT20F	UPRT20F-BC03	11-14-2012	Ponar	85.71	6243.2-18	47	47	0											
UPRT20G	UPRT20G-BC01	11-14-2012	Ponar	50.00	6243.2-19	0	0	40											
UPRT20G	UPRT20G-BC02	11-14-2012	Ponar	75.00	6243.2-20	53	80	27											
UPRT20G	UPRT20G-BC03	11-14-2012	Ponar	25.00	6243.2-21	0	80	80											
UPRT21A	UPRT21A-BC01	11-14-2012	Ponar	31.25	6243.2-22	256	128	192											
UPRT21A	UPRT21A-BC02	11-14-2012	Pon																

APPENDIX I. SUMMARY OF BENTHIC INVERTEBRATE COMMUNITY METRICS

2012 Freshwater Benthic Invertebrate Community Reference Data

Appendix I. Average Community Metrics by Location

Location	RM	Abundance (per m ²) ^a		Hilsenhoff Biotic Index (EcoAnalysts) ^b		Hilsenhoff Biotic Index (NYDEC) ^b		Pielou's J'		Shannon-Wiener H' (log 10) ^c		Shannon-Wiener H' (log 2) ^c		Shannon-Wiener H' (log e) ^c		Species Richness		Swartz's Dominance Index	
		Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev
UPRT18H	17.7	11500	1230	9.42	0.17	9.41	0.179	0.683	0.0569	0.873	0.107	2.9	0.362	2.01	0.249	19	2.65	4.33	1.15
UPRT18I	17.6	20600	9060	8.92	0.184	8.64	0.224	0.737	0.0231	0.98	0.0361	3.26	0.114	2.26	0.0777	21.7	1.53	5.67	0.577
UPRT18J	17.7	16800	4500	9.65	0.0929	9.69	0.07	0.537	0.0321	0.637	0.0321	2.11	0.107	1.47	0.0751	15.7	0.577	2	0
UPRT18K	18.0	16100	4710	9.2	0.356	8.85	0.539	0.647	0.0651	0.863	0.127	2.87	0.41	1.99	0.288	22	3.46	4	1
UPRT19J	18.2	1030	677	9.58	0.126	9.62	0.0764	0.633	0.0153	0.55	0.167	1.84	0.552	1.27	0.384	8.33	4.51	2.33	0.577
UPRT19K	18.3	11800	6310	8.48	0.191	8.53	0.207	0.76	0.0173	1.16	0.0208	3.84	0.0709	2.67	0.0503	33	1	9	0
UPRT19L	18.6	14300	10200	8.49	0.719	8.19	0.838	0.723	0.1	1.02	0.261	3.39	0.857	2.35	0.597	25.7	9.29	6.67	3.21
UPRT19M	18.8	15200	5500	8.71	0.266	8.25	0.34	0.75	0.0529	1.04	0.0889	3.45	0.284	2.39	0.195	24	1	6.33	1.53
UPRT20A	19.2	9950	6100	8.75	0.02	8.39	0.0839	0.727	0.0379	0.923	0.0493	3.07	0.168	2.13	0.116	18.7	0.577	5.33	0.577
UPRT20B	19.2	19500	13300	9.15	0.365	8.94	0.36	0.617	0.0737	0.843	0.114	2.8	0.377	1.94	0.264	23	1	4.33	0.577
UPRT20C	19.4	3820	251	9.56	0.147	9.56	0.12	0.623	0.0635	0.673	0.0586	2.24	0.184	1.55	0.131	12.3	3.06	3	0
UPRT20D	19.5	15100	4500	8.6	0.358	8.7	0.362	0.737	0.0321	1.11	0.0794	3.69	0.257	2.56	0.174	32.3	4.16	7	1
UPRT20E	19.7	5500	5930	7.95	0.43	7.86	0.374	0.86	0.0436	1.15	0.08	3.83	0.26	2.65	0.18	23	8	8.33	1.53
UPRT20F	19.8	9180	2540	8.28	0.198	7.99	0.191	0.813	0.00577	1.19	0.0115	3.97	0.0462	2.75	0.0289	29.7	1.15	9.67	1.15
UPRT20G	19.9	16100	9270	9.03	0.127	8.82	0.151	0.727	0.0252	0.927	0.0462	3.08	0.159	2.13	0.11	19	3	5.67	1.15
UPRT21A	20.1	11200	9690	8.69	0.34	8.28	0.377	0.72	0.0458	0.95	0.0608	3.16	0.192	2.19	0.131	21	1	4.33	0.577
UPRT21B	20.2	18400	11600	9.53	0.0781	9.48	0.0611	0.54	0.01	0.677	0.0231	2.25	0.0781	1.56	0.0577	18	1	2.67	0.577
UPRT21C	20.3	11500	8010	8.04	0.332	7.95	0.295	0.79	0.0361	1.19	0.0208	3.94	0.07	2.73	0.0493	32.3	5.51	9.33	0.577
UPRT21D	20.5	13400	12500	8.08	0.554	8.08	0.595	0.717	0.0929	0.947	0.104	3.14	0.353	2.18	0.244	21.3	1.53	5	1
UPRT21E	20.6	6390	1130	9.05	0.103	8.69	0.18	0.643	0.0208	0.78	0.0361	2.59	0.114	1.79	0.0764	16.7	2.52	3.67	0.577
UPRT21F	20.7	14000	12800	8.61	0.167	8.4	0.304	0.697	0.0513	0.987	0.0351	3.27	0.126	2.27	0.0854	26.7	4.16	6	1
UPRT21G	20.9	2070	446	8.52	0.155	7.64	0.207	0.773	0.0208	0.873	0.0833	2.91	0.284	2.01	0.197	13.7	2.52	4.33	1.15
UPRT22A	21.2	3490	1950	7.87	0.3	6.84	0.0987	0.617	0.0379	0.767	0.0252	2.54	0.0907	1.76	0.0656	17.7	2.08	4	0
UPRT22B	21.3	5880	231	7.44	0.26	7.02	0.242	0.667	0.0764	0.94	0.132	3.12	0.427	2.16	0.295	25.3	2.52	5	1.73

^a. Abundance values have been corrected for laboratory subsampling and normalized to the area of the Ponar grab sampler.

^b. EcoAnalysts originally calculated a Hilsenhoff Biotic Index based on typical Pacific Northwest organic enrichment tolerance values. NYDEC provides more regionally relevant tolerance values.

^c. Three Shannon-Wiener calculations are provided based on different logarithmic bases. The "log e" method is most common in the literature and will be used for the LPRSA ecological risk assessment for benthic invertebrates.

Note: additional sampling location data are provided in Appendix A and in the Replicate-level Metrics Data table in this Appendix.

2012 Freshwater Benthic Invertebrate Community Reference Data

Appendix I. Community Metrics by Replicate

SampleID	Location	Collection Date	Collection Time	Collection Method	Habitat	Percent Subsampled	EcoAnalysts SampleID	Abundance	Corrected Abundance	Abundance (per m ²) ^a	Hilsenhoff Biotic Index (EcoAnalysts) ^b	Hilsenhoff Biotic Index (NYDEC) ^b	Pielou's J'	Shannon-Wiener H' (log 10) ^c	Shannon-Wiener H' (log 2) ^c	Shannon-Wiener H' (log e) ^c	Swartz's Dominance Index	Percent of Top 1 Dominant Taxon	Percent of Top 2 Dominant Taxa
UPRT18H-BC01	UPRT18H	11-12-2012	1229	Ponar	Freshwater	83.3	6243.1-1	419	502.8	10100	9.32	9.3	0.7	0.93	3.08	2.13	5	34.13	56.09
UPRT18H-BC02	UPRT18H	11-12-2012	1237	Ponar	Freshwater	66.7	6243.1-2	401	601.5	12000	9.62	9.62	0.62	0.75	2.48	1.72	3	51.62	66.58
UPRT18H-BC03	UPRT18H	11-12-2012	1250	Ponar	Freshwater	56.3	6243.1-3	348	619.44	12400	9.33	9.32	0.73	0.94	3.13	2.17	5	31.03	45.98
UPRT18I-BC01	UPRT18I	11-12-2012	1035	Ponar	Freshwater	37.5	6243.1-4	363	969.21	19400	9.12	8.9	0.71	0.95	3.17	2.2	5	33.88	52.89
UPRT18I-BC02	UPRT18I	11-12-2012	1046	Ponar	Freshwater	25.0	6243.1-5	378	1512	30200	8.87	8.54	0.75	0.97	3.23	2.24	6	35.45	48.41
UPRT18I-BC03	UPRT18I	11-12-2012	1056	Ponar	Freshwater	58.3	6243.1-6	357	610.47	12200	8.76	8.49	0.75	1.02	3.39	2.35	6	28.57	42.02
UPRT18J-BC01	UPRT18J	11-12-2012	1343	Ponar	Freshwater	50.0	6243.1-7	353	706	14100	9.75	9.77	0.5	0.6	1.99	1.38	2	48.73	83.85
UPRT18J-BC02	UPRT18J	11-12-2012	1352	Ponar	Freshwater	45.8	6243.1-8	329	717.22	14300	9.57	9.64	0.55	0.66	2.18	1.51	2	40.73	79.33
UPRT18J-BC03	UPRT18J	11-12-2012	1402	Ponar	Freshwater	29.4	6243.1-9	323	1098.2	22000	9.62	9.66	0.56	0.65	2.17	1.51	2	45.82	78.64
UPRT18K-BC01	UPRT18K	11-12-2012	1447	Ponar	Freshwater	37.5	6243.1-10	353	942.51	18900	9.32	9.05	0.65	0.84	2.8	1.94	4	45.33	58.92
UPRT18K-BC02	UPRT18K	11-12-2012	1453	Ponar	Freshwater	62.5	6243.1-11	335	536	10700	9.48	9.26	0.58	0.75	2.5	1.73	3	48.36	67.16
UPRT18K-BC03	UPRT18K	11-12-2012	1500	Ponar	Freshwater	41.7	6243.1-12	391	938.4	18800	8.8	8.24	0.71	1	3.31	2.3	5	22.51	44.25
UPRT19J-BC01	UPRT19J	11-13-2012	858	Ponar	Freshwater	100.0	6243.1-13	82	82	1640	9.45	9.55	0.63	0.7	2.33	1.62	3	56.1	70.73
UPRT19J-BC02	UPRT19J	11-13-2012	909	Ponar	Freshwater	100.0	6243.1-14	15	15	300	9.6	9.6	0.62	0.37	1.24	0.86	2	73.33	86.67
UPRT19J-BC03	UPRT19J	11-13-2012	919	Ponar	Freshwater	100.0	6243.1-15	57	57	1140	9.7	9.7	0.65	0.58	1.94	1.34	2	57.89	77.19
UPRT19K-BC01	UPRT19K	11-13-2012	959	Ponar	Freshwater	41.7	6243.1-16	394	945.6	18900	8.26	8.31	0.78	1.18	3.92	2.72	9	27.41	35.79
UPRT19K-BC03	UPRT19K	11-13-2012	1019	Ponar	Freshwater	100.0	6243.1-17	349	349	6980	8.6	8.72	0.75	1.14	3.78	2.62	9	34.38	44.13
UPRT19K-BC04	UPRT19K	11-13-2012	1028	Ponar	Freshwater	73.8	6243.1-18	347	468.45	9370	8.58	8.56	0.75	1.15	3.83	2.66	9	31.99	43.23
UPRT19L-BC02	UPRT19L	11-13-2012	1116	Ponar	Freshwater	100.0	6243.1-19	140	140	2800	9.32	9.16	0.61	0.72	2.4	1.66	3	54.29	67.14
UPRT19L-BC03	UPRT19L	11-13-2012	1122	Ponar	Freshwater	50.0	6243.1-20	437	874	17500	8.15	7.68	0.8	1.19	3.95	2.74	9	16.7	29.75
UPRT19L-BC04	UPRT19L	11-13-2012	1126	Ponar	Freshwater	35.4	6243.1-21	399	1125.18	22500	8.01	7.74	0.76	1.15	3.81	2.64	8	23.56	36.59
UPRT19M-BC01	UPRT19M	11-13-2012	1224	Ponar	Freshwater	37.5	6243.1-22	319	851.73	17000	8.99	8.58	0.69	0.94	3.13	2.17	5	33.86	55.8
UPRT19M-BC02	UPRT19M	11-13-2012	1231	Ponar	Freshwater	33.3	6243.1-23	326	978	19600	8.68	8.27	0.77	1.07	3.55	2.46	6	19.63	38.34
UPRT19M-BC03	UPRT19M	11-13-2012	1238	Ponar	Freshwater	100.0	6243.1-24	452	452	9040	8.46	7.9	0.79	1.11	3.67	2.54	8	21.68	39.38
UPRT20A-BC01	UPRT20A	11-13-2012	1349	Ponar	Freshwater	37.5	6243.2-1	307	819.69	16400	8.77	8.34	0.7	0.9	2.98	2.07	5	38.11	53.09
UPRT20A-BC02	UPRT20A	11-13-2012	1406	Ponar	Freshwater	75.0	6243.2-2	346	460.18	9200	8.73	8.35	0.71	0.89	2.96	2.05	5	42.2	54.05
UPRT20A-BC03	UPRT20A	11-13-2012	1413	Ponar	Freshwater	100.0	6243.2-3	213	213	4260	8.75	8.49	0.77	0.98	3.26	2.26	6	27.23	44.13
UPRT20B-BC01	UPRT20B	11-13-2012	1456	Ponar	Freshwater	22.9	6243.2-4	399	1739.64	34800	8.74	8.53	0.7	0.97	3.22	2.23	5	30.08	47.87
UPRT20B-BC03	UPRT20B	11-13-2012	1511	Ponar	Freshwater	58.3	6243.2-5	332	567.72	11400	9.29	9.11	0.56	0.75	2.49	1.72	4	55.72	65.96
UPRT20B-BC04	UPRT20B	11-13-2012	1517	Ponar	Freshwater	50.0	6243.2-6	304	608	12200	9.43	9.19	0.59	0.81	2.69	1.86	4	51.97	60.86
UPRT20C-BC01	UPRT20C	11-14-2012	832	Ponar	Freshwater	100.0	6243.2-7	204	204	4080	9.39	9.44	0.66	0.74	2.45	1.7	3	40.69	61.27
UPRT20C-BC02	UPRT20C	11-14-2012	841	Ponar	Freshwater	100.0	6243.2-8	190	190	3800	9.67	9.68	0.66	0.63	2.11	1.46	3	40	64.21
UPRT20C-BC03	UPRT20C	11-14-2012	847	Ponar	Freshwater	100.0	6243.2-9	179	179	3580	9.61	9.57	0.55	0.65	2.16	1.49	3	48.04	70.39
UPRT20D-BC01	UPRT20D	11-14-2012	1013	Ponar	Freshwater	50.0	6243.2-10	351	702	14000	8.91	8.93	0.7	1.02	3.4	2.36	6	31.62	48.72
UPRT20D-BC02	UPRT20D	11-14-2012	1022	Ponar	Freshwater	70.8	6243.2-11	396	558.36	11200	8.69	8.88	0.76	1.14	3.78	2.62	7	18.18	33.84
UPRT20D-BC03	UPRT20D	11-14-2012	1036	Ponar	Freshwater	43.8	6243.2-12	436	998.44										

2012 Freshwater Benthic Invertebrate Community Reference Data

Appendix I. Community Metrics by Replicate

SampleID	Location	Collection Date	Collection Time	Collection Method	Habitat	Percent Subsampled	EcoAnalysts SampleID	Abundance	Corrected Abundance	Abundance (per m ²) ^a	Hilsenhoff Biotic Index (EcoAnalysts) ^b	Hilsenhoff Biotic Index (NYDEC) ^b	Pielou's J'	Shannon-Wiener H' (log 10) ^c	Shannon-Wiener H' (log 2) ^c	Shannon-Wiener H' (log e) ^c	Swartz's Dominance Index	Percent of Top 1 Dominant Taxon	Percent of Top 2 Dominant Taxa
UPRT20F-BC02	UPRT20F	11-14-2012	1215	Ponar	Freshwater	65.5	6243.2-17	397	607.41	12100	8.1	7.87	0.81	1.18	3.92	2.72	9	20.65	34.51
UPRT20F-BC03	UPRT20F	11-14-2012	1223	Ponar	Freshwater	85.7	6243.2-18	318	372.06	7440	8.24	7.89	0.82	1.2	4	2.77	9	17.61	31.45
UPRT20G-BC01	UPRT20G	11-14-2012	1302	Ponar	Freshwater	50.0	6243.2-19	323	646	12900	9.17	8.96	0.75	0.9	2.99	2.07	5	35.29	49.23
UPRT20G-BC02	UPRT20G	11-14-2012	1308	Ponar	Freshwater	75.0	6243.2-20	331	440.23	8800	8.98	8.84	0.73	0.98	3.26	2.26	7	35.65	44.71
UPRT20G-BC03	UPRT20G	11-14-2012	1314	Ponar	Freshwater	25.0	6243.2-21	331	1324	26500	8.93	8.66	0.7	0.9	2.98	2.07	5	37.16	54.08
UPRT21A-BC01	UPRT21A	11-14-2012	1400	Ponar	Freshwater	31.3	6243.2-22	350	1120	22400	8.6	8.17	0.71	0.92	3.07	2.13	4	29.14	51.14
UPRT21A-BC02	UPRT21A	11-14-2012	1407	Ponar	Freshwater	100.0	6243.2-23	275	275	5500	9.07	8.7	0.68	0.91	3.03	2.1	4	25.45	42.18
UPRT21A-BC03	UPRT21A	11-14-2012	1414	Ponar	Freshwater	100.0	6243.2-24	287	287	5740	8.41	7.97	0.77	1.02	3.38	2.34	5	18.82	36.24
UPRT21B-BC01	UPRT21B	11-15-2012	834	Ponar	Freshwater	73.8	6243.2-25	399	538.65	10800	9.49	9.43	0.55	0.69	2.3	1.59	3	52.88	73.18
UPRT21B-BC02	UPRT21B	11-15-2012	842	Ponar	Freshwater	54.8	6243.2-26	346	633.18	12700	9.48	9.47	0.54	0.69	2.29	1.59	2	39.6	78.61
UPRT21B-BC03	UPRT21B	11-15-2012	850	Ponar	Freshwater	20.8	6243.2-27	330	1584	31700	9.62	9.55	0.53	0.65	2.16	1.49	3	60.91	73.33
UPRT21C-BC01	UPRT21C	11-15-2012	937	Ponar	Freshwater	39.6	6243.2-28	384	971.52	19400	7.94	7.86	0.78	1.21	4.02	2.79	10	21.09	35.94
UPRT21C-BC02	UPRT21C	11-15-2012	943	Ponar	Freshwater	66.7	6243.2-29	393	589.5	11800	7.77	7.71	0.76	1.18	3.91	2.71	9	21.12	39.69
UPRT21C-BC03	UPRT21C	11-15-2012	951	Ponar	Freshwater	100.0	6243.2-30	169	169	3380	8.41	8.28	0.83	1.17	3.89	2.7	9	20.12	37.87
UPRT21D-BC01	UPRT21D	11-15-2012	1018	Ponar	Freshwater	100.0	6243.2-31	210	210	4200	8.34	8.45	0.78	1.03	3.41	2.36	6	21.9	40.95
UPRT21D-BC02	UPRT21D	11-15-2012	1022	Ponar	Freshwater	75.0	6243.2-32	320	425.6	8510	8.45	8.39	0.76	0.98	3.27	2.27	5	21.88	42.19
UPRT21D-BC03	UPRT21D	11-15-2012	1027	Ponar	Freshwater	29.2	6243.2-33	402	1378.86	27600	7.44	7.39	0.61	0.83	2.74	1.9	4	47.01	60.2
UPRT21E-BC01	UPRT21E	11-15-2012	1102	Ponar	Freshwater	100.0	6243.2-34	366	366	7320	9.16	8.89	0.62	0.79	2.62	1.81	4	39.89	58.47
UPRT21E-BC02	UPRT21E	11-15-2012	1106	Ponar	Freshwater	100.0	6243.2-35	257	257	5140	9.02	8.64	0.65	0.74	2.46	1.71	3	45.53	65.37
UPRT21E-BC03	UPRT21E	11-15-2012	1111	Ponar	Freshwater	100.0	6243.2-36	336	336	6720	8.96	8.54	0.66	0.81	2.68	1.86	4	32.74	53.27
UPRT21F-BC01	UPRT21F	11-15-2012	1142	Ponar	Freshwater	100.0	6243.2-37	319	319	6380	8.8	8.74	0.71	1.02	3.39	2.35	7	36.99	50.78
UPRT21F-BC02	UPRT21F	11-15-2012	1147	Ponar	Freshwater	26.8	6243.2-38	385	1436.05	28700	8.51	8.16	0.64	0.95	3.14	2.18	5	31.69	59.48
UPRT21F-BC03	UPRT21F	11-15-2012	1155	Ponar	Freshwater	100.0	6243.2-39	342	342	6840	8.51	8.29	0.74	0.99	3.29	2.28	6	30.41	53.22
UPRT21G-BC01	UPRT21G	11-15-2012	1231	Ponar	Freshwater	100.0	6243.2-40	89	89	1780	8.35	7.45	0.79	0.9	2.99	2.07	5	29.21	48.31
UPRT21G-BC02	UPRT21G	11-15-2012	1235	Ponar	Freshwater	100.0	6243.2-41	129	129	2580	8.57	7.86	0.78	0.94	3.14	2.17	5	27.13	48.06
UPRT21G-BC03	UPRT21G	11-15-2012	1238	Ponar	Freshwater	100.0	6243.2-42	92	92	1840	8.65	7.6	0.75	0.78	2.59	1.79	3	34.78	57.61
UPRT22A-BC01	UPRT22A	11-16-2012	830	Ponar	Freshwater	100.0	6243.2-43	87	87	1740	7.64	6.77	0.66	0.79	2.62	1.82	4	52.87	60.92
UPRT22A-BC02	UPRT22A	11-16-2012	834	Ponar	Freshwater	100.0	6243.2-44	280	280	5600	8.21	6.95	0.59	0.77	2.55	1.77	4	55.36	64.64
UPRT22A-BC03	UPRT22A	11-16-2012	838	Ponar	Freshwater	100.0	6243.2-45	157	157	3140	7.76	6.79	0.6	0.74	2.44	1.69	4	56.05	68.15
UPRT22B-BC01	UPRT22B	11-16-2012	917	Ponar	Freshwater	100.0	6243.2-46	285	285	5700	7.16	6.76	0.75	1.09	3.61	2.5	7	26.32	40.35
UPRT22B-BC02	UPRT22B	11-16-2012	926	Ponar	Freshwater	100.0	6243.2-47	290	290	5800	7.5	7.05	0.65	0.89	2.95	2.04	4	38.97	63.45
UPRT22B-BC03	UPRT22B	11-16-2012	933	Ponar	Freshwater	100.0	6243.2-48	307	307	6140	7.67	7.24	0.6	0.84	2.81	1.95	4	44.3	66.45

^a: Abundance (per m²) values have been corrected for laboratory subsampling and normalized to the area of the Ponar grab sampler.

^b: EcoAnalysts originally calculated a Hilsenhoff Biotic Index based on typical Pacific Northwest organic enrichment tolerance values. NYDEC provides more regionally relevant tolerance values.

^c: Three Shannon-Wiener calculations are provided based on different logarithmic bases. The "log e" method is most common in the literature and will be used for the LPRSA ecological risk assessment for benthic invertebrates.

Note: additional sampling location information is provided in Appendix A.

2012 Freshwater Benthic Invertebrate Community Reference Data

Appendix I. Community Metrics by Replicate

SampleID	Location	Collection Date	Collection Time	Collection Method	Habitat	Percent of Top 3 Dominant Taxa	1st Dominant Abundance (Corrected)	1st Dominant Taxon	2nd Dominant Abundance (Corrected)	2nd Dominant Taxon	3rd Dominant Abundance (Corrected)	3rd Dominant Taxon
UPRT18H-BC01	UPRT18H	11-12-2012	1229	Ponar	Freshwater	66.59	172	Limnodrilus hoffmeisteri	110	Chironomus sp.	53	Quistadrilus multisetosus
UPRT18H-BC02	UPRT18H	11-12-2012	1237	Ponar	Freshwater	75.81	311	Limnodrilus hoffmeisteri	90	Chironomus sp.	56	Quistadrilus multisetosus
UPRT18H-BC03	UPRT18H	11-12-2012	1250	Ponar	Freshwater	59.77	192	Limnodrilus hoffmeisteri	93	Chironomus sp.	85	Quistadrilus multisetosus
UPRT18I-BC01	UPRT18I	11-12-2012	1035	Ponar	Freshwater	61.16	328	Limnodrilus hoffmeisteri	184	Chironomus sp.	80	Aulodrilus pigueti
UPRT18I-BC02	UPRT18I	11-12-2012	1046	Ponar	Freshwater	56.88	536	Limnodrilus hoffmeisteri	196	Aulodrilus limnobius	128	Aulodrilus pigueti
UPRT18I-BC03	UPRT18I	11-12-2012	1056	Ponar	Freshwater	53.22	174	Limnodrilus hoffmeisteri	82	Aulodrilus limnobius	68	Chironomus sp.
UPRT18J-BC01	UPRT18J	11-12-2012	1343	Ponar	Freshwater	87.25	344	Limnodrilus hoffmeisteri	248	Chironomus sp.	24	Limnodrilus udekemianus
UPRT18J-BC02	UPRT18J	11-12-2012	1352	Ponar	Freshwater	83.89	292	Tubificidae w/o cap. setae	277	Chironomus sp.	33	Tubificidae w/ cap. setae
UPRT18J-BC03	UPRT18J	11-12-2012	1402	Ponar	Freshwater	84.83	503	Limnodrilus hoffmeisteri	360	Chironomus sp.	68	Tubificidae w/ cap. setae
UPRT18K-BC01	UPRT18K	11-12-2012	1447	Ponar	Freshwater	68.27	427	Limnodrilus hoffmeisteri	128	Chironomus sp.	88	Aulodrilus limnobius
UPRT18K-BC02	UPRT18K	11-12-2012	1453	Ponar	Freshwater	77.91	259	Limnodrilus hoffmeisteri	101	Chironomus sp.	58	Aulodrilus limnobius
UPRT18K-BC03	UPRT18K	11-12-2012	1500	Ponar	Freshwater	59.34	211	Tubificidae w/o cap. setae	204	Aulodrilus limnobius	142	Chironomus sp.
UPRT19J-BC01	UPRT19J	11-13-2012	858	Ponar	Freshwater	76.83	46	Chironomus sp.	12	Procladius sp.	5	Limnodrilus hoffmeisteri
UPRT19J-BC02	UPRT19J	11-13-2012	909	Ponar	Freshwater	93.33	11	Chironomus sp.	2	Procladius sp.	1	Tanytarsus sp.
UPRT19J-BC03	UPRT19J	11-13-2012	919	Ponar	Freshwater	85.96	33	Chironomus sp.	11	Procladius sp.	5	Tanypus sp.
UPRT19K-BC01	UPRT19K	11-13-2012	959	Ponar	Freshwater	43.91	259	Limnodrilus hoffmeisteri	79	Slavina appendiculata	77	Ilyodrilus templetoni
UPRT19K-BC03	UPRT19K	11-13-2012	1019	Ponar	Freshwater	51.58	120	Limnodrilus hoffmeisteri	34	Tubificidae w/ cap. setae	26	Aulodrilus limnobius
UPRT19K-BC04	UPRT19K	11-13-2012	1028	Ponar	Freshwater	53.03	150	Limnodrilus hoffmeisteri	53	Tubificidae w/ cap. setae	46	Aulodrilus limnobius
UPRT19L-BC02	UPRT19L	11-13-2012	1116	Ponar	Freshwater	77.14	76	Limnodrilus hoffmeisteri	18	Cryptochironomus sp.	14	Chironomus sp.
UPRT19L-BC03	UPRT19L	11-13-2012	1122	Ponar	Freshwater	38.67	146	Aulodrilus pigueti	114	Limnodrilus hoffmeisteri	78	Tanytarsus sp.
UPRT19L-BC04	UPRT19L	11-13-2012	1126	Ponar	Freshwater	47.87	265	Limnodrilus hoffmeisteri	147	Tanytarsus sp.	127	Arcteonais lomondi
UPRT19M-BC01	UPRT19M	11-13-2012	1224	Ponar	Freshwater	64.58	288	Limnodrilus hoffmeisteri	187	Aulodrilus pigueti	75	Ilyodrilus templetoni
UPRT19M-BC02	UPRT19M	11-13-2012	1231	Ponar	Freshwater	48.16	192	Aulodrilus pigueti	183	Limnodrilus hoffmeisteri	96	Chironomus sp.
UPRT19M-BC03	UPRT19M	11-13-2012	1238	Ponar	Freshwater	49.12	98	Aulodrilus pigueti	80	Limnodrilus hoffmeisteri	44	Aulodrilus limnobius
UPRT20A-BC01	UPRT20A	11-13-2012	1349	Ponar	Freshwater	63.52	312	Procladius sp.	123	Aulodrilus pigueti	85	Quistadrilus multisetosus
UPRT20A-BC02	UPRT20A	11-13-2012	1406	Ponar	Freshwater	63.58	194	Procladius sp.	55	Aulodrilus pigueti	44	Quistadrilus multisetosus
UPRT20A-BC03	UPRT20A	11-13-2012	1413	Ponar	Freshwater	54.93	58	Procladius sp.	36	Quistadrilus multisetosus	23	Limnodrilus hoffmeisteri
UPRT20B-BC01	UPRT20B	11-13-2012	1456	Ponar	Freshwater	62.41	523	Limnodrilus hoffmeisteri	310	Procladius sp.	253	Aulodrilus pigueti
UPRT20B-BC03	UPRT20B	11-13-2012	1511	Ponar	Freshwater	73.19	316	Limnodrilus hoffmeisteri	58	Aulodrilus pigueti	41	Chironomus sp.
UPRT20B-BC04	UPRT20B	11-13-2012	1517	Ponar	Freshwater	69.41	316	Limnodrilus hoffmeisteri	54	Procladius sp.	52	Tubificidae w/ cap. setae
UPRT20C-BC01	UPRT20C	11-14-2012	832	Ponar	Freshwater	78.92	83	Quistadrilus multisetosus	42	Limnodrilus hoffmeisteri	36	Procladius sp.
UPRT20C-BC02	UPRT20C	11-14-2012	841	Ponar	Freshwater	81.58	76	Quistadrilus multisetosus	46	Procladius sp.	33	Ilyodrilus templetoni
UPRT20C-BC03	UPRT20C	11-14-2012	847	Ponar	Freshwater	88.83	86	Quistadrilus multisetosus	40	Procladius sp.	33	Limnodrilus hoffmeisteri
UPRT20D-BC01	UPRT20D	11-14-2012	1013	Ponar	Freshwater	62.68	222	Limnodrilus hoffmeisteri	120	Quistadrilus multisetosus	98	Procladius sp.
UPRT20D-BC02	UPRT20D	11-14-2012	1022	Ponar	Freshwater	48.74	102	Quistadrilus multisetosus	87	Limnodrilus hoffmeisteri	83	Procladius sp.
UPRT20D-BC03	UPRT20D	11-14-2012	1036	Ponar	Freshwater	47.02	245	Limnodrilus hoffmeisteri	119	Quistadrilus multisetosus	105	Gammarus sp.
UPRT20E-BC01	UPRT20E	11-14-2012	1123	Ponar	Freshwater	44.2	22	Quistadrilus multisetosus	21	Limnodrilus hoffmeisteri	18	Arcteonais lomondi
UPRT20E-BC02	UPRT20E	11-14-2012	1127	Ponar	Freshwater	36.16	102	Arcteonais lomondi	62	Procladius sp.	58	Gammarus sp.
UPRT20E-BC03	UPRT20E	11-14-2012	1134	Ponar	Freshwater	40.28	11	Quistadrilus multisetosus	9	Helobdella elongata	9	Tubificidae w/o cap. setae
UPRT20F-BC01	UPRT20F	11-14-2012	1206	Ponar	Freshwater	45.98	90	Limnodrilus hoffmeisteri	68	Procladius sp.	27	Chironomus sp.

2012 Freshwater Benthic Invertebrate Community Reference Data

Appendix I. Community Metrics by Replicate

SampleID	Location	Collection Date	Collection Time	Collection Method	Habitat	Percent of Top 3 Dominant Taxa	1st Dominant Abundance (Corrected)	1st Dominant Taxon	2nd Dominant Abundance (Corrected)	2nd Dominant Taxon	3rd Dominant Abundance (Corrected)	3rd Dominant Taxon
UPRT20F-BC02	UPRT20F	11-14-2012	1215	Ponar	Freshwater	43.32	125	Limnodrilus hoffmeisteri	84	Aulodrilus limnobius	54	Procladius sp.
UPRT20F-BC03	UPRT20F	11-14-2012	1223	Ponar	Freshwater	42.45	66	Limnodrilus hoffmeisteri	51	Procladius sp.	41	Gammarus sp.
UPRT20G-BC01	UPRT20G	11-14-2012	1302	Ponar	Freshwater	62.23	228	Limnodrilus hoffmeisteri	90	Quistadrilus multisetosus	84	Aulodrilus pigueti
UPRT20G-BC02	UPRT20G	11-14-2012	1308	Ponar	Freshwater	53.78	157	Limnodrilus hoffmeisteri	40	Aulodrilus pigueti	40	Limnodrilus udekemianus
UPRT20G-BC03	UPRT20G	11-14-2012	1314	Ponar	Freshwater	64.65	492	Limnodrilus hoffmeisteri	224	Aulodrilus pigueti	140	Ilyodrilus templetoni
UPRT21A-BC01	UPRT21A	11-14-2012	1400	Ponar	Freshwater	66.29	326	Tubificidae w/o cap. setae	246	Aulodrilus pigueti	170	Aulodrilus limnobius
UPRT21A-BC02	UPRT21A	11-14-2012	1407	Ponar	Freshwater	58.91	70	Limnodrilus udekemianus	46	Aulodrilus limnobius	46	Aulodrilus pigueti
UPRT21A-BC03	UPRT21A	11-14-2012	1414	Ponar	Freshwater	51.57	54	Aulodrilus pigueti	50	Aulodrilus limnobius	44	Limnodrilus hoffmeisteri
UPRT21B-BC01	UPRT21B	11-15-2012	834	Ponar	Freshwater	80.7	285	Limnodrilus hoffmeisteri	109	Quistadrilus multisetosus	41	Procladius sp.
UPRT21B-BC02	UPRT21B	11-15-2012	842	Ponar	Freshwater	83.24	251	Quistadrilus multisetosus	247	Limnodrilus hoffmeisteri	29	Procladius sp.
UPRT21B-BC03	UPRT21B	11-15-2012	850	Ponar	Freshwater	79.7	965	Limnodrilus hoffmeisteri	197	Quistadrilus multisetosus	101	Ilyodrilus templetoni
UPRT21C-BC01	UPRT21C	11-15-2012	937	Ponar	Freshwater	50.78	205	Procladius sp.	144	Arcteonais lomondi	144	Limnodrilus hoffmeisteri
UPRT21C-BC02	UPRT21C	11-15-2012	943	Ponar	Freshwater	50.89	125	Arcteonais lomondi	110	Procladius sp.	66	Limnodrilus hoffmeisteri
UPRT21C-BC03	UPRT21C	11-15-2012	951	Ponar	Freshwater	46.15	34	Limnodrilus hoffmeisteri	30	Procladius sp.	14	Arcteonais lomondi
UPRT21D-BC01	UPRT21D	11-15-2012	1018	Ponar	Freshwater	58.1	46	Quistadrilus multisetosus	40	Procladius sp.	36	Limnodrilus hoffmeisteri
UPRT21D-BC02	UPRT21D	11-15-2012	1022	Ponar	Freshwater	57.19	93	Limnodrilus hoffmeisteri	86	Quistadrilus multisetosus	64	Slavina appendiculata
UPRT21D-BC03	UPRT21D	11-15-2012	1027	Ponar	Freshwater	70.15	648	Slavina appendiculata	182	Quistadrilus multisetosus	137	Limnodrilus hoffmeisteri
UPRT21E-BC01	UPRT21E	11-15-2012	1102	Ponar	Freshwater	74.86	146	Limnodrilus hoffmeisteri	68	Chironomus sp.	60	Aulodrilus limnobius
UPRT21E-BC02	UPRT21E	11-15-2012	1106	Ponar	Freshwater	78.6	117	Limnodrilus hoffmeisteri	51	Aulodrilus limnobius	34	Aulodrilus pigueti
UPRT21E-BC03	UPRT21E	11-15-2012	1111	Ponar	Freshwater	70.54	110	Limnodrilus hoffmeisteri	69	Aulodrilus pigueti	58	Aulodrilus limnobius
UPRT21F-BC01	UPRT21F	11-15-2012	1142	Ponar	Freshwater	59.25	118	Limnodrilus hoffmeisteri	44	Aulodrilus pigueti	27	Chironomus sp.
UPRT21F-BC02	UPRT21F	11-15-2012	1147	Ponar	Freshwater	68.57	455	Limnodrilus hoffmeisteri	399	Aulodrilus pigueti	131	Aulodrilus limnobius
UPRT21F-BC03	UPRT21F	11-15-2012	1155	Ponar	Freshwater	61.4	104	Limnodrilus hoffmeisteri	78	Aulodrilus pigueti	28	Aulodrilus limnobius
UPRT21G-BC01	UPRT21G	11-15-2012	1231	Ponar	Freshwater	62.92	26	Corbicula sp.	17	Tubificidae w/o cap. setae	13	Ilyodrilus pigueti
UPRT21G-BC02	UPRT21G	11-15-2012	1235	Ponar	Freshwater	58.91	35	Limnodrilus hoffmeisteri	27	Corbicula sp.	14	Aulodrilus limnobius
UPRT21G-BC03	UPRT21G	11-15-2012	1238	Ponar	Freshwater	75	32	Corbicula sp.	21	Limnodrilus hoffmeisteri	16	Prostoma sp.
UPRT22A-BC01	UPRT22A	11-16-2012	830	Ponar	Freshwater	68.97	46	Corbicula sp.	7	Cryptochironomus sp.	7	Prostoma sp.
UPRT22A-BC02	UPRT22A	11-16-2012	834	Ponar	Freshwater	72.5	155	Corbicula sp.	26	Tubificidae w/o cap. setae	22	Cryptochironomus sp.
UPRT22A-BC03	UPRT22A	11-16-2012	838	Ponar	Freshwater	74.52	88	Corbicula sp.	19	Cryptochironomus sp.	10	Dicrotendipes neomodestus
UPRT22B-BC01	UPRT22B	11-16-2012	917	Ponar	Freshwater	53.33	75	Corbicula sp.	40	Dicrotendipes neomodestus	37	Prostoma sp.
UPRT22B-BC02	UPRT22B	11-16-2012	926	Ponar	Freshwater	70.34	113	Dicrotendipes neomodestus	71	Corbicula sp.	20	Prostoma sp.
UPRT22B-BC03	UPRT22B	11-16-2012	933	Ponar	Freshwater	71.99	136	Dicrotendipes neomodestus	68	Corbicula sp.	17	Cryptochironomus sp.

a. Abundance (per m²) values have been corrected for laboratory subsampling an

b. EcoAnalysts originally calculated a Hilsenhoff Biotic Index based on typical Pacific

c. Three Shannon-Wiener calculations are provided based on different logarithmic

Note: additional sampling location information is provided in Appendix A.